Department of Built Environment

Rethinking Design Competitions to Promote Urban Development - A Comparative Analysis

A case study of contemporary international design competitions in Finland and China

Zheng Liang

Aalto University

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Rethinking Design Competitions to Promote Urban Development - A Comparative Analysis

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Zheng Liang

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Abstract

International design competitions have a long history with demon-strated importance to our urban environment. In the current era of globalization, it is of greater importance to understand better how in-ternational design competitions evolve, how various stakeholders are engaged in a coordinated fashion, and how the resulting knowledge is elevated, transformed and applied in a global perspective.

Rooted on four case studies and one action research study, the disser-tation aims to analyze how the international design competitions facili-tate the transfer of design knowledge between various professional groups, especially between established designers and young practition-ers. The study starts with a systematic comparative analysis of interna-tional design competitions: case 1 and case 2 from Finland and China, respectively. The particular focus is on illustrating/conceptualizing the knowledge flow of design competitions and thus identifying the key factors governing the knowledge flow process. Therefore, the concepts of 'trading zone' (TZ) and 'boundary object' (BO) are employed to re-veal how the expertise is integrated with respect to different local infra-structures.

The case 3 and case 4 extend the study to elaborate the knowledge transfer process among multi-disciplinary groups. The role of an inter-national design competition as a 'designed trading zone' is found in-creasingly important in our urban environment and it undoubtedly im-proves the exchange of knowledge on sustainable urban development. However, the knowledge flow interacts intensively with local coordina-tion in terms of system, institution and professions. In this regard, the TZ and BO analysis was carried out to reveal, analyze and compare how this local coordination varies between Finland and China.

The comparative analysis and summary of the findings provide insights for rethinking the potential roles of design competitions in facilitating design knowledge flow. The action research is introduced at this phase for examining the acquired findings from the previous case studies. As a conclusion, the 'designed trading zone' with enriched and balanced inter-language is critical to facilitate the knowledge flow of internation-al design competitions.

Keywords Design competitions, trading zone, boundary object, design knowledge

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Zheng Liang

Helsinki, 2 May 2016

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1 Introduction

1.1 Design knowledge and design competitions

Architecture and urban design and planning are believed to possess a high degree of complexity, and this observation lies on the specific complexity of the design process. The observation of this complexity is, however, fragmented in the design literature. Buchanan (1995) recognizes pluralism and discursive complexity as characteristics of design. In addition, there exists no clear definition of design quality despite a long history. Moreover, heterogeneous levels of communication and technologies of representation (e.g., images, text, models and spoken discourses) intertwine during the design process. Different components of social interactions, economic concerns, and political groups (e.g., consumers, public authorities, developers and investors), avant-garde designers, academics and the various construction sites and preconditions further increase the degrees of complexity and vagueness to design research.

In the 1960s, there were studies focusing on design methods with computer programs for problem solving such as the soft-system approach. Archer (1970) pointed out that the computer technology has greatly challenged the conventional ideas on design for the assessment of design problems. Since then, design researches have been shifted from pure professional practices to interdisciplinary perspectives (Jones, 1970; Buchanan and Margolin, 1995). Case studies have been conducted to better understand the design process and methods, which are closely connected to the topic of how to define design problems. In short, design problems are solved by three methods by researchers: 1) science of design, 2) physical characteristics, and 3) knowing in practice. Simon (1969) coined the concept of 'science of design' with an emphasis on 'what ought to be' rather than 'what is'. Design in his view is a set of problem-related procedures with rationale and solutions involving decomposing systems as well as identifying alternatives (Simon, 1962). Conversely, Alexander (1964, 1971) argued for the importance of physical characteristics such as design forms, and he rejected the design methodology proposed by Simon. The complexity of a design problem has been well recognized. The literature addresses ill-defined

or even ‘wicked problems’, which cannot be solved by science and engineering (Rittel and Webber, 1973; Churchman, 1967; Simon, 1973; Schön, 1987). Case studies have been made on the basis of design cognition or design thinking to better understand how designers think and work (Cross, 1996; Cross, 1982). Schön (1991) argued that designers actually rely more on what they learned in practice, namely the ‘knowing-in-practice’. According to Schön, the design process as ‘reflection-in-action’ is based on reflective practices of designing other than rational problem solving activity.

The three methods above highlight the importance of systematically defining and solving design problems. Owen (1994, 2) advocates the replacement of the term 'research' for knowledge because building knowledge, after all, is the goal of research. Most importantly, the knowledge on how the design issues are defined, analyzed and solved is critical to achieve a more appropriate design solution with an interdisciplinary approach.

The ‘interdisciplinary approach’ is important. Nelson and Stolterman (2003) emphasize in their book entitled ‘The Design Way’ that the research methods to analyze what design knowledge is and how it is constituted and applied are critical. They state,

> ‘Every chosen form of inquiry – intuitive, artistic, scientific, logic or a composite thereof – will lead to a specific body of knowledge. The chosen form of inquiry influences both what constitutes knowledge and how knowledge is gained. Each particular approach is based on some fundamental assumptions concerning what it means to create knowledge’ (Nelson and Stolterman, 2003, 38).

The interdisciplinary approach is achieved, for example, by a matrix approach. Buchanan (1998, 13) explains design thinking by means of integrating four design areas-orders: 1) communication, 2) construction, 3) strategic planning and 4) systemic integration, with the designer’s abilities of A) inventing, B) judging, C) deciding and D) evaluating, in a matrix (see Figure 1). He considered the matrix as the history of the ‘character and discipline of design thinking as formed through encounters with new problems’ (Buchanan, 1995a, 1995b, 1998). Buchanan further argues that the matrix could serve as a heuristic device for investigating the ‘shifting debate about design in the contemporary world’ (Buchanan 1998, 13).

	Communication Signs & Words	**Construction** Things	**Strategic Planning** Action	**Systemic Integration** Thought
Inventing	Signs, Symbols & Images	→	→	→
Judging		Physical Objects	→	→
Deciding			Activities, Services & Processes	→
Evaluating				Systems, Environments, Ideas & Values

Figure 1, Design thinking and human integration matrix. Source: Buchanan 1998, 13

The matrix approach to a certain degree resembles the process of a general design competition case. This approach gives us a hint to thoroughly explore the design competition to illustrate the flow of design knowledge. In addition, the often-forgotten interrelations of the stakeholders during the design and planning knowledge flow are included in design research on design competitions. Newton and Backhouse (2013) suggest the employment of open ideas competitions as a research strategy to develop design knowledge. For instance, a practical research project entitled 'Future Proofing Schools' was carried out, aiming to promote competitions as a 'form of crowdsourcing to leverage knowledge between academia and industry' (Newton and Backhouse, 2013, 1).

In this dissertation, the notion of design competition, as a device of producing or transforming design knowledge, is explored. Design competitions involve multidisciplinary and heterogeneous settings of actors, elements, networks and conditions. These factors interact with each other, and accordingly facilitate or contradict the flow of design knowledge. Particularly, the elucidation of interrelations among stakeholders is expected to reveal the complicate process of knowledge flow. Herein, case studies of international design competitions are performed to illustrate how design and planning are engaged with diverse stakeholders, interdisciplinary understandings and various procedures. The primary goal of this dissertation is thus to conceptualize, compare, reveal and elaborate how design knowledge is accumulated, transformed and applied by professionals with different disciplinary backgrounds through the format of international design competitions.

1.2 International design competitions in public projects

Design competitions have a long history. The first ever recorded design competition in literature dates back to 448 BC. It was organized by Greeks for constructing a war memorial on the Acropolis in Athens (Hurwit, 2000). Since then, design competitions have yielded many well-known magnificent public works all over the world (Nazar, 1999). Nowadays, the importance of interna-

tional design competitions continues to grow in public architecture. Adamczyk (2004) points out that a design competition generates public debate and awareness of the project's impact on our cities. He claims: 'Competitions play a key participatory role in the definition of social values, in the context of a public sphere of debate' (Adamczyk, 2004, 2). Sudjic (2005) stresses the importance of a successful competition system in building better cities: 'It allows for the competition to become a norm, used in a variety of different ways, to cut down on wasted effort, to identify new talent, and nurture it.' (Sudjic, 2005, 65). Not surprisingly, design competitions are considered as a standard method to discover new talent; stimulate public debate and publicity; encourage young architects and ensure design quality along with prominent projects. In particular, the importance of design competitions is increasingly recognized as a tool to meet changing regulations of public works procurement in the European Union and World Trade Organization (WTO). As Sudjic (2006) states, throughout the European Union, an element of competition is now mandatory in the procurement of buildings and infrastructure, and competitions are used. To maximize the use of design competitions, documenting and preserving all design competition resources and methods was undertaken[1], as the first step. However, architects have criticized that design competitions can convey the risks of hindering necessary communications between participants and clients. The role and value of design competitions in the process of shaping the urban environment is currently a hot debated topic among architects, professional organizations, the media and public works authorities (Adamczyk, 2004). In general, the scholars' and historians' views approach the use of design competitions from two perspectives, as follows:

- Competition in its current format discourages quality in architecture and planning solutions by giving partiality to originality and personal expression over professional experience (Adamczyk, 2004). Pelli (Nazar, 1999, 28) argues that the competition system distorts the design process. He thinks that the essential phase for a good design of building, which is the result of a special type of collaboration of architect with clients and users, cannot be fully realized in an open competition. The competition procedures are questionable due to their rigidity, discouraging communication. As Sudjic (2006) points out, open competitions are, rightly or wrongly, a risk for both established architects and anxious clients for the unpredictability of competition results. Additionally, the cost involved in working on projects for competition is expensive especially from the side of architects, working possibly without definitive compensation.

- Others argue that the competition serves as an essential way for ensuring and improving design quality. Larson (1994, 498) highlights the productivity of competitions in spite of its abusive aspects: 'even for

[1] The university laboratory of Montreal has classfied the resources of design competition (competition brief, project information etc), there are archives of Canadian competitions and Europan-France competitions, http://www.leap.umontreal.ca/index.php?id=1&lang=en, accessible on 08/04/2016

those who are outspokenly cynical about competitions, the process simulates real work.' Adamczyk (2004) also considers competitions as a source of an intellectual heritage that deserves to be documented and preserved regardless of prizewinning or not.

It is hard to argue against competitions in the face of the many major examples of competition winning buildings that have served to define the architectural history of the 20th century (Sudjic, 2006). The design competition system is a good example of promoting the unprecedented design solutions, identifying new talent and nurturing it. These features were achieved in the design competition of the Florence cathedral dome[2] in 1418 and its many successors coming after. Lipstadt (2006) emphasizes the importance of identifying competitions that were deemed excellent by those who participated in them, and to extract models for best, or at least better practice from them. Accordingly, research has already been conducted in this field[3] with respect to the importance of design competitions to our urban environment.

Even though there exists some literature on design competitions, systematically produced up-to-date knowledge and proper comparative studies at the international level are rare. Alexander and Witzling (1990) state that most studies on design competitions – even those that are more systematic – are 'prescriptive' or 'normative'. They tend to draw on anecdotal knowledge and intuitive experience and seem to aim primarily at the promotion and improvement of competitions. Malmberg (2006, 3) holds that there is a 'confusion over the role of the competition itself and how it translates into the built piece of work'. As Lipstadt (2006) argues, the situation gives rise to a quasi-mystic association of competitions with invention and also with the discovery of some pre-existing genius out there in the community of planners and designers.

This condition emphasizes the importance of the Phase 1 of this research (see Table 1). It is therefore necessary to address the systematic overview of design competitions regarding their important role in our changing urban environment.

To avoid the shortcomings of previous design competition studies, I analyze design competitions on a systematically-comparative and interactive basis. By means of thoroughly examining different roles and networks in design competitions, and their relations with our urban environment, design competitions can be better understood, analysed and compared as synergistic platforms in enhancing sustainable urban development. Four representative international design competition cases are analysed.

[2] The Cathedral of 'Santa Maria del Fiore 'in Florence

[3] Such as Prof. Andrea Kahn's research (Kahn, 2007) of 'constructing urbanisms: case studies of urban design competitions', examining the synergies or impact of design issues, methods and representational strategies involved in design competitions, to explore contemporary attitudes toward urban design. The trend of architecture and urbanism can be gleaned from examining how competitions with urban aspirations set forth challenges, delineate sites, and articulate goals.

Systematic overview of international design competitions is conducted in Research Phase 1 in this disseration. In Research Phase 2, the vocabularies and typologies of international design competitions are elaborated and analysed with the conceptual tools of design issues, design concepts and design forms (I-C-F) formalism, boundary object and trading zone. In Research Phase 3 and 4, the findings of four case studies are compared, synthesized and examined by a summary of a one-month workshop on dialogue-based design competition.

1.3 Thesis outline

Case studies of international design competitions on contemporary urban projects towards sustainability in Finland and China were chosen. Firstly, histories of four cases are introduced by exploring the structure of competition system. Next, insights are made on ongoing developments gained from increasing changes of design competitions in Finland and China. Based on those four representative case studies, the following questions (as illustrated in the conceptual framework) are to be answered:

- Are the international design competitions of the case studies analyzable in terms of boundary object and/or trading zone concepts?
- What are the implications in terms of facilitating the design knowledge flow?

A review of literature on the complicated nature of international design competitions is described in Chapter 1. Research design and methods on how the concepts of 'trading zone' and 'boundary object' can be used in conceptualizing urban design and planning competitions are defined in Chapter 2. In Chapters 3 and 4, four case studies are described, emphasizing how international design competitions were set up, and how they interacted and developed in both Finland and China. In Chapter 5 and 6, a comparative account and synthesis is made with the help of an action research. The developments of design competitions both in China and Finland are compared, which represents specific models of interaction with professionals, government and the public. The findings are discussed in Chapter 7 and relevant implications are drawn as the final piece of the thesis.

1.4 Summary

The overall goal of this thesis is to illustrate, identify and disseminate procedural innovations in terms of knowledge transfer, rooted on comparative analysis of design competitions on large-scale urban projects in both Finland and China. To adequately analyze design competitions, regulations and competition documents, as well as other accessible documents, are summarized. Based on the aforementioned methods, the proposed research is believed to supply

us with possibilities of tracing the usually hidden roles and networks of the competitions.

The research at hand is relevant to practice because design competitions play an exceptionally important role for urban development in Finland and China. The history of design competitions in Finland is over 130 years. Needless to say, design competitions also play an extremely significant role in China. However, most design competitions in China have been questioned regarding fairness, transparency, and functionality[4] . Therefore, comparative and systematic analysis on new competition rules is necessary in the context of fast urban development in China. Furthermore, this study will benefit Chinese urban developers and supply a Chinese literature reference for the practice and improvement of international intellectual exchanges. Most importantly, the research will also contribute to potential procedural innovations and collaboration in terms of knowledge transfer.

[4] The Ministry of Construction, State Development and Reform Commission, the Ministry of Finance, the Ministry of Supervision, the Audit Commission of China. In order to deal with such situations, on January 11, 2007, they jointly issued 'Several Opinions on Enhancing the Administration of Large-scale Public Building Projects' to avoid blindly held international design competitions, which might undermine the sustainability of resources and energy, conservation, land use, landscape, functionality and security. Retrieved from http://www.gov.cn/gzdt/2007-01/11/content_492868.htm

2 Conceptualizing the International Design Competition

2.1 International design competitions in Finland and China

Design competitions have a long history in Europe. Nowadays, design competitions play an increasingly important role in our urban environment, attributed to the changing regulations on public procurement in the course of European Union integration[5]. Particularly in the Nordic countries, design competitions are taken as a gold-standard method for guaranteeing design quality and stimulating innovations at both governmental and professional levels. As a matter of fact, the design competition has been adopted as a tool in the design and architectural policies enforced by local, regional and national governments (Andersson, Kazemian & Rönn, 2009, 3).

As a country with a firm tradition of design competitions, Finland is often seen as the role model of utilizing design competitions. Since the early 20th century[6], design competitions started to play an important role in the early industrialization of the country. The present Finnish competition rules are a culmination of 130 years of continuous improvement, and they have steered the development of architecture in both Finland and Sweden (Huotelin & Kaipiainen, 2006, 1). At the professional level, architectural competitions in Finland are administered by the Finnish Association of Architects (SAFA). Indeed, the development of the Finnish design competition policy is heavily rooted in the foundation of SAFA, and it has been influenced by the Swedish rules as well (Huotelin & Kaipiainen, 2006; Solla, 1992). Almost all open competitions in Finland are well documented and publicly accessible. The final results of invited competitions are published on the SAFA website, in the Museum of Finnish Architecture and in the appendix of the Finnish Architectural Review (Huotelin & Kaipiainen, 2006). These open sources provide essential information for researchers. They also render the competition procedures and

[5] It is connected with the EU Directive on Project Competitions (Directive 2004/18/EC), which provides common procurement regulations for the Member States.
[6] Statistics Finland 1917-2007, retrieved from http://www.stat.fi/tup/suomi90/helmikuu_en.html.

results more transparent to the public. Therefore, it is wothwhile to take the Finnish design competition system as a comparative background to better understand the evolution trajectory of design competitions in developing countries, particularly in China.

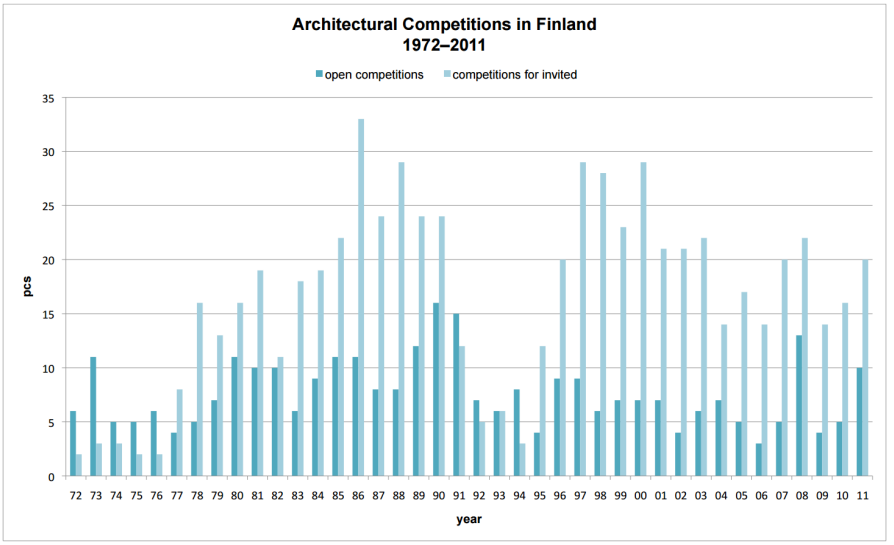

Figure 2. Design competitions in Finland 1972–2011[7]

Design competitions were introduced to China in 1984, to stimulate competitive design solutions for urban development tasks, which were internally assigned by the government (National Bureau of Statistics of China, 1999). In the late 1990s, design competitions in an international framework were under consideration along with large-scale projects, and foreign architectural design agencies were hired more frequently (Wu, 2007; Ren, 2006; Xue, 2009). Along with this development, the involvement of international design firms has become the norm. Later on, the importance of design competitions in China further increased as a consequence of changing regulations on public procurement in the course of World Trade Organization (WTO) integration. Nowadays, this competition concept is being increasingly recognized and developed in China during its rapid urbanization, as major Chinese cities with large development programs have been confronted with the pressure of inter-city competition in the last couple of decades (Wu, 2007). Particularly in the past decade, the successful hosting of multiple international events established certain milestones and further stimulated the need of ensuring international-standard design quality to future large-scale projects.

[7] SAFA competitions 1972-2011, retrieved from http://www.safa.fi/eng/architectural_competitions/

In current legal terms, a domestic design competition is compulsory for large-scale construction projects apart from certain exceptions, as specified by the Chinese Ministry of Housing and Urban-Rural Development (MHURD, 2008)[8]. In this respect, international design competitions have emerged as the platform for accumulating ideas to solidify international design quality into prominent construction projects in China. From November 7, 2011, to November 2, 2012, there were over 200 urban planning and design competitions held in China[9]. However, some of them were criticized for either rigidity or vagueness. As a result, pertinent national regulations were issued to avoid such blindly-held international design competitions as 'image projects'.

As it stands, in-depth and systematic studies of design competitions and their development trajectory in China are rare. Particularly, the adaptation of the design competition system within the Chinese socio-economic context needs to be scrutinized to better illustrate the knowledge flow process of international design competitions. The substantial Chinese-Western culture gap and the complicated social and political scenarios have rendered a different knowledge transfer path for international design competitions that are held in China, in comparison to the Western model.

In China, the Ministry of Housing and Urban-Rural Development under the State Council is responsible for uniformly supervising and administrating the design bidding of construction project schemes across the country. Due to the lack of professional competition rules, design competitions in China relied initially on the 'Bidding Law of the People's Republic of China' issued in 1999. The law was mainly used for the business-tendering field. In 2003, the 'Measures for Survey and Design Bidding of Construction Projects' was issued. However, it has problems that need to be further addressed, such as no guarantee on design-knowledge property rights, the ill-focused pursuit of international design formats and a lack of transparency during the competition process and subsequent project assignments. In 2008, the issued 'Administrative Measures for Design Bidding of Construction Project Schemes'[10] clearly defined the issue of compensation, intellectual property rights, jury panels, evaluation criteria, types and forms, qualifications of tenderers, and content of the

[8] As quoted from the competition regulation, 'Administrative Measures for Design Bidding of Construction Project Schemes', if any of the following circumstances apply, then the design of that project may be exempted from bidding upon approval of the related department:
-The project involves national security or state secrets;
-The project is for emergency treatment and disaster relief;
-The major techniques and technology employ certain patents or knowhow, or there are special requirements for the architectural modeling;
-The technology is so complicated or professional that there are fewer than three design institutions that can satisfy the conditions and no effective competition can be formed;
-A completed project needs to be reconstructed, expanded, or needs technical reform, and design by other institutions will affect the support functions of the project;
- Any other circumstances provided by any laws or regulations under which the design bidding may be exempted.

[9] As quoted from the official bidding information platform for the construction industry in China (retrieved from http://www.jszhaobiao.com/search.html?keyword=%B3%C7%CA%D0%C9%E8%BC%C6&keywordand=&keywordnot=&scope=2&area=&dt=365&advflag=&btns=1%2C2%2C5%2C6%2C8%2C9).

[10] As reported by the official China Construction News from an interview with Mr Wang ZaoSheng, the Vice Director of the Administrative Department of the Construction Market of the Ministry of Construction, retrieved from http://www.chinajsb.cn/gb/content/2008-04/05/content_239918.htm

bidding plans. In particular, Bidding 2008 aimed to clarify the role of the international design competition in the Chinese construction market. However, the architects are still critical, as the evaluation of the design bidding process is neither transparent nor accessible. Moreover, opening international design competitions without rules on the assignment of the project vis-à-vis the winning entry is a specific problem. As yet, no professional competition rules, in any concise form, concerning the interrelations between the organizers, competitors and jury panels on international competitions have been set (Dai, 2011).

Establishing architectural design competition rules and procedures throughout China is difficult. In Finland, competition procedures are established by the SAFA in the Finnish architectural design competition scheme. On the other hand, Chinese architects are still adapting themselves to the development of international design competitions. The domestic architects have mainly been trained within a physical design perspective, and Chinese urban planning practice has followed a much narrower guideline (Abramson, 2002; Wu, 2007); the Chinese architects are capable of dealing with the new component of market economy only in a limited sense, such as with the development of the central business district (Wu, 2007).

With challenge comes opportunity. For example, Dai (2011) pointed out that the competitive atmosphere among Chinese architectural firms actually stimulates the internal structural adjustment of the domestic design competition system and promotes communication and exchange regarding design knowledge. To architects, both international and local, international design competitions now offer, more than ever, tremendous opportunities together with risks. On the one hand, international design competitions offer great learning opportunities for Chinese architects. Through the competition mechanism, willingly or reluctantly, Chinese architects have been pushed to improve their design skills to reach an international standard, instead of passively accepting internally-assigned projects from the government. Meanwhile, international architects have been testing their abilities under multi-cultural circumstances. On the other hand, fierce disputes have also arisen with respect to cultural, social and self-interest conflicts on different design quality values. For instance, Rem Koolhaas won the international design competition of the Chinese Central Television (CCTV) building. This competition was spotlighted due to the openness of the design issue, leaving space for a strenuous lobbying campaign (Sudjic, 2005). This openness led to a fierce dispute involving both the public and the architects. Mr. Peigen Peng, a well-known Chinese architect, complained that China is 'the new weapon testing zone for some foreign architects via international design competitions, and they are aimlessly pursuing for visual stimulation and designing monster-like buildings which they have no chance to realize in their own country'[11]. Last but not the least, the construc-

[11] As reported by Lei Cheng, 'China Cannot Be the Testing Zone of Buildings of Evil.' China Youth Daily, published on March 16, 2009. Retrieved from http://zqb.cyol.com/content/2009-03/16/content_2582196.htm

tion of the winning design from international design competitions is normally carried out by Chinese construction firms. This is because most foreign architectural design firms have qualification to provide design consulting services only. Therefore, Xue (2008) criticized the unfairly low number of commissions and the heavy workload for local professionals compared to the significant number of commissions for the foreign designers.

As for the decision makers, the international design competitions offer them the chance of accumulating international architectural design ideas. Therefore, these integrated ideas can be used to enable the reconsideration of their internally-assigned decisions. However, the design solutions brought by the competitions are often in serious conflict with the project context. Some large-scale public building image projects have been constructed with poor quality control. Consequently, a document[12] striving to avoid blindly-held international design competitions on large-scale public building, was jointly issued by five ministries in 2007. The document made recommendations on academic and transparent decision-making for design initiatives, evaluation and control of design quality and project budget. The document was concerned about the type and form of design competitions, devising competition document records and feasibility studies on project implementation. In the document, Chinese design competitions are promoted over international competitions. For the Chinese developers, along with the increasing internationalization of China, the aim is to promote the local project at the international level, to obtain more profit and recognition.

In the field of urban planning, which is closely related to local social, economic and political conditions, an international design competition has normally been adopted as a consulting service. For example, the results of the international conceptual urban planning design competition of Shanghai World Expo 2010 partly made the city government to rethink the initially-defined Expo project site, and they finally changed the project site from the mainland to the riverfront site (Yang, 2003). The organizer of the international design competition has relatively more freedom to define how to use the winning entry and advance the concept compared to the tendering organization. International design competitions are accepted as tools for accumulating design knowledge in the major cities of China (Xu & Cai, 1999; Wu, 2007; Peng & Jiang, 2005; Dai, 2011).

On the other hand, in Finland, over the past decades, the guidelines for planning and design competitions in the construction sector have been revised

[12] The Ministry of Construction, State Development and Reform Commission, the Ministry of Finance, the Ministry of Supervision, the Audit Commission of China. In order to deal with such situations, on January 11, 2007, they jointly issued 'Several Opinions on Enhancing the Administration of Large-scale Public Building Projects' to avoid blindly held international design competitions, which might undermine the sustainability of resources and energy, conservation, land use, the landscape, functionality and security. Retrieved from http://www.gov.cn/gzdt/2007-01/11/content_492868.htm

based on the integration of EU directives on public procurement by the SAFA[13], while the Finnish Competition authority (FCA) is responsible for competition regulation in Finland. The FCA investigates competition restrictions both on the European competition guidelines and on the basis of complaints received. Recently, a conflict has resulted between the rigidity of the architectural competition condition applied by the SAFA and the supervision of FCA.

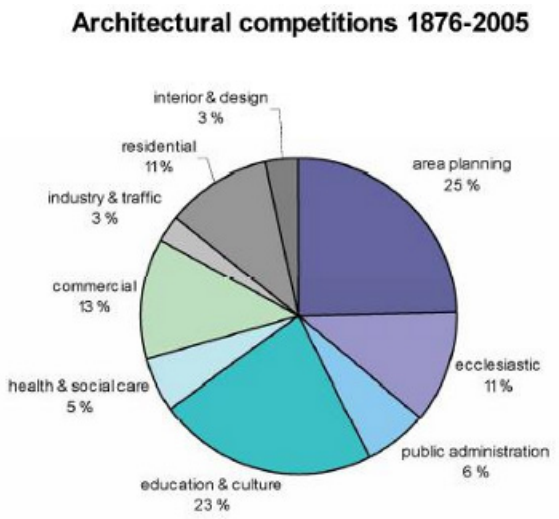

Figure 3. Pie chart of Finnish architecture design competitions by type from 1876-2005. Source: Kaipiainen, 2006, 1

In Finland, design competitions have been broadly used in the fields of education, culture and area planning (Figure 3). Competitions have served as a resource for promoting young talent, documenting and promoting design knowledge exchange. The architects also helped to form the competition rules.

2.2 Competition initiatives, developments and applications

In general, the competition process includes a sponsor (also known as initiator or client) who initiates the design competition and supplies resources for holding the competition. The sponsor normally meets with professional advisors for defining the design competition specifications. With the assistance of professional advisors, the sponsor defines a brief scheme and the ultimate objectives of competitions under his/her political, economic and social agenda. The professional advisors play a crucial role in developing and testing the competition process. In some cases, other parties, such as technical advisors, are also appointed by the sponsor due to the complexity of the project. The professional advisors are also responsible for assisting the selection of the Jury, setting

[13] SAFA-Finnish: *Suomen Arkkitehtiliitto*, Swedish: *Finlands Arkitektförbund*, English: Finnish Association of Architects) is the professional body representing architects in Finland.

up the procedural rules and selection criteria. The procedural rules define the competition conditions and processes which each team must obey during the competition process. The Jury will evaluate the competitors and select winners and distinguish the qualities, according to the selection criteria specified in the project program document. The Jury writes a competition brief in a mutual agreement.

The actors (professional advisor, sponsor, jury, participants), competition documents, conditions (e.g., social environment, cultural history, political will, and budget) and other possible factors are intertwined during the competition process and contribute to the various outputs (e.g., CAD file, 3D presentation) of the design competition. In particular, the design and planning method is introduced, transformed and applied through the whole process of design competition (see Figure 4).

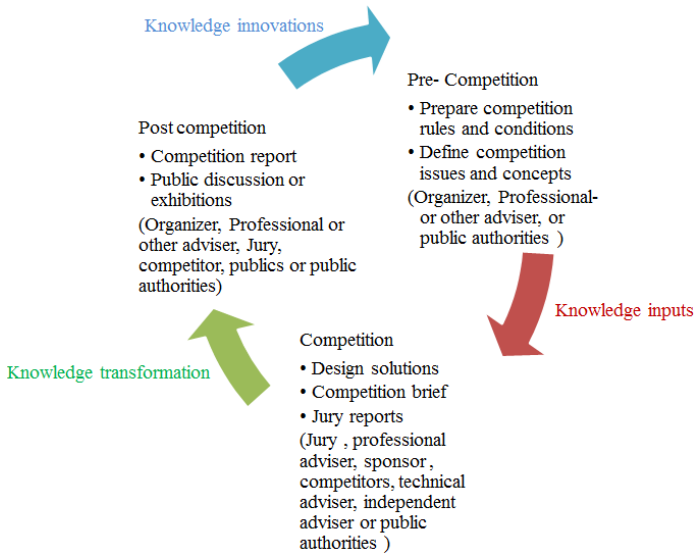

Figure 4. The knowledge flow process of a general design competition.

Whereas the above-mentioned studies revealed the complicated nature of international design competitions both in Finland and China, the next sections describe the intriguing interactions of stakeholders and interrelated preconditions.

2.3 Boundary objects and trading zones to conceptualize international design competitions

The concepts of 'trading zone' (TZ) and 'boundary object' (BO) are closely interconnected in sociological research of science and technology. Star and Griesemer (1989) introduced the concept of 'boundary object' in their historical analysis of coordinated interactions of actors from different 'social worlds',

including scientists, trappers, amateur collectors and university administrators. These actors provided and catalogued fur specimens for the newly-built Museum of Vertebrate Zoology at the University of California in the first decades of the 20th century. In this example, the boundary objects were demonstrated to enable coordinated interaction towards different aims, such as gathering scientific evidence for the researchers, profitable trade for the trappers, documentation of California's fauna for the amateur collectors, and academic prestige for the university administration. As vehicles in coordinating and facilitating such multi-cultural interaction, it was concluded that boundary objects are

> 'objects which both inhabit several intersecting social worlds and satisfy the informational requirements of each of them. Boundary objects are objects which are plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual use. These objects may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds.' (Star & Griesemer 1989, 393).

Through their 'plastic' characteristics, boundary objects are taken as bridges between different communities of practice or even social worlds (Wenger, 1998; Becker, 1982) by means of translating ideas, viewpoints, and values across the boundaries. They are seen as useful for knowledge sharing, since boundary objects help to bridge the access to different types of knowledge as they can allow coordination without consensus (Bechky, 2003). That is to say, they can allow the different actors' understandings to be framed differently on the common task. Juhasz and Balsamo (2012) further proposed the concept of 'boundary objects that learn' and acknowledged the role of boundary objects in the knowledge-learning process. Four different kinds of boundary objects (repositories, ideal types, coincident boundaries, and standardized forms) were identified in Star and Griesemer's Vertebrate Museum study (Star & Griesemer, 1989, 411).

The application of the boundary object has been further extended to the study of urban planning and design since 1990s. Henderson (1991) adopted BO in analyzing design activities, especially with visual representations such as maps, diagrams and drawings. Henderson further discussed the positive and negative effects of drawings as boundary objects along with the development of digital technology of CAD (Henderson, 1999). As Bowker and Star (2000, 298) argued: 'they are not only material but can be 'stuff and things, tools, artefacts and techniques, and ideas, stories and memories'. Bechky (2003) further argued that drawings acted as such kinds of boundary objects in negotiations among engineers that span social world boundaries from design to manufacturing.

On the other hand, there are researches criticizing the degree of flexibility of boundary objects across different social worlds. For instance, Fujimura (1992) argued that the flexible structure of boundary objects would hinder their possible success regarding coherence in the form of standardization. However, Lee (2007, 318) suggested more free-form boundary objects other than structured and standardized boundary objects, which she called 'boundary negotiating artifacts' as separate forms, which have a different definition than boundary objects defined by Star and Griesemer. She further argued that, regarding active negotiation processes, the boundary object theory is weak in enabling 'active negotiation of shared understanding' (Lee, 2007). Mäntysalo and Kanninen (2013) also stated that boundary objects connect only statically social worlds without 'being part of the evolving boundary interactions' (Galison, 2010, 46).

This study of international design competitions is mainly dealing with dynamic processes involving interactions among concepts, instruments, networks, models and most importantly different professionals. In order to better grasp the knowledge flow process among various stakeholders of different 'social worlds', the concept of 'trading zone' naturally emerged as a conceptual tool for comprehending the characteristics of knowledge flow in international design competitions between a number of participants.

'Trading zone' is originally defined as coordinated interaction between scientists and engineers with evolving hybrid languages. Galison (1997) has developed the term 'trading zone' in order to explain the emergence of collaborative capacity across disciplinary boundaries in the development of particle detectors and radar during WW II. Theoretical physicists and radio engineers exchanged information and services successfully without a comprehension of each other's individual disciplines.

> 'I intend the term 'trading zone' to be taken seriously, as a social, material and intellectual mortar binding together the disunified traditions of experimentation, theorizing and instrument building.' (Galison 1997, 803).

The distinction between trading zones and boundary objects is made on the degree of integrations between the actors and their understandings (Galison, 2010). The trading zone concept is used to denote an interface between different social worlds and, further, a tool in developing their interaction. Trading zone focuses on coordinated interaction between scientists and professionals as a locally emerging and evolving hybrid language, whereas BO denotes fixed artefacts and concepts for a certain fixed purpose of multi-cultural collaboration. In general, BO is taken as a limited case of trading zone: 'boundary objects might be thought of as a kind of time slice of a trading language' (Galison, 2010, 46). This is also closely related to the 'inter-language' of trading zone. Galison argued as below that 'inter-languages', as semispecific pidgins, or even full-fledged creoles, can be generated for the local coordination of different

systems of discourse despite their global differences (Galison, 1997, 783; Gorman, 2010).

> 'Two groups can agree on rules of exchange even if they ascribe utterly different significance to the objects being exchanged; they may even disagree on the meaning of the exchange process itself. Nonetheless, the trading partners can hammer out a local coordination, despite vast global differences. In an even more sophisticated way, cultures in interaction frequently establish contact languages, systems of discourse that can vary from the most function-specific jargons, through semi specific pidgins, to full-fledged creoles rich enough to support activities as complex as poetry and metalinguistic reflection.' (Galison 1997, 783)

Galison (1997) discovered the development of 'inter-languages' from a work studying cooperation among multiple scientific disciplines. The words, concepts and rules are re-defined in the coordination process between the participating actors. Moreover, the groups of different disciplines need to share a 'pidgin', through which they can share the local meanings of particular words or concepts whilst keeping their different meanings in their home cultures. A 'pidgin' may develop into a 'creole', which is capable of expressing more ideas and can even evolve to new academic disciplines. In other words, through the development of 'inter-languages', independent groups move toward a shared platform. The shared evolving local platform serves in mutual coordination and development of 'thin descriptions'. This further enables the exchange of information and services between different epistemic groups that do not share a deeper comprehension of each other's respective professional languages or even ideological beliefs. It is the 'local infrastructures of shared concepts and instruments that had enabled such exchange' which Galison identified as 'trading zones' (Galison, 1997). He stressed the importance of knowing, 'how these scientific subcultures connected to each other, to the surrounding world, and to change' (Galison, 2010, 30).

Similarly, design competitions involve many stakeholders with various disciplines and cultural backgrounds, and yet facilitate mutual understanding and subsequent cooperation between the stakeholders. This aspect implies great potential of applying BO and TZ in the process of design competitions. Indeed, the trading zone and boundary object concepts have already been employed to planning studies. Mäntysalo, Balducci and Kangasoja (2011) discussed the theoretical potential of the trading zone concept in re-examining the 'communicative thinness' of Charles E Lindblom's Partisan Mutual Adjustment, in the context of multi-cultural and multi-professional planning. Communicative planning theory stresses that mutual understanding and consensus may be unfeasible. The trading zone approach to communicative planning claims that a planner should deliberately aim for a set of 'thin descriptions' and locally-focused mutual coordination instead of a broad consensus (Mäntysalo, Balducci and Kangasoja, 2011). Thin descriptions and locally-focused coordination may make a trading zone dialogue among stakeholders both feasible and

intriguing. Recently, in the book entitled 'Urban Planning as a Trading Zone', Balducci and Mäntysalo collected numerous Italian and Finnish case studies, by a group of researchers, of both trading zone and boundary objects in urban planning (Balducci & Mäntysalo, 2013). In this book, Fedeli reported of two idea competitions, having the capacity to serve as a 'device designed and promoted in order to produce new 'zones for trading' around 'problems of the public' in conditions in which traditional planning tools and devices have shown their limits and aporia' (Fedeli, 2013, 41). Furthermore, Mäntysalo, Balducci and Kangasoja (2011) stressed the importance of 'a trading zone of planning, where each party involved would have the capacity to sufficiently grasp the meaning of issues and solution proposals to be traded with' (Mäntysalo, Balducci and Kangasoja, 2011, 262) – in the face of 'practico-linguistical challenges involved in attempting to create local conditions for meaningful bargaining and compromising between the 'subcultures' of interest groups' (ibid.).

2.4 Research design and methods

In this thesis, I advocate design competition as a potential device designed to produce new 'trading zones' in the urban planning field. I will follow this line of thinking and consider international design competitions as tools to generate new 'trading zones' of communication (Liang & Mäntysalo, 2013). A design competition as a 'designed trading zone' (Fedeli, 2013, 41) may provide us an empirical case to identify, trace and analyze the interrelations of different stakeholders involved, in connection to local conditions. The aim is to scrutinize the relevance of 'trading zones' in the context of international design competitions in the chosen case studies both in Finland and China. I will analyse how the 'thin descriptions' and locally-focused coordination are constituted, evolved and employed during the competition process, aiming to clarify the vague nature of competitions. Moreover, I will identify the crucial factors, which seve to improve communication and interaction of different actors and networks.

The aim of the dissertation is to elucidate the knowledge flow of international design competitions. Previous international design competitions are studied to illustrate knowledge flow. The factors either hindering or facilitating the knowledge flow are pinpointed. There are studies focusing on how to 'reuse' the existing knowledge of a design case into future design situations, which is known as case-based design (Kalay, 2004; Heylighen and Neuckermans, 2001). Kalay pointed out that past experience or design knowledge is contained in the form of 'case' of validated solutions to complex problems. The design communication process in Kalay's view is presented as a process of decoding and encoding information referring to the knowledge system of actors such as clients and professionals. However, the perception gaps among different knowledge system of various actors emphasize the importance of introduc-

ing the conceptual tool of trading zone and boundary object to better analyze the knowledge flow.

The design issues, design concepts and design forms (I-C-F) formalism proposed by Oxman (1994) is considered as one of the solutions in incorporating precedent knowledge in a new design task in the field of case-based design. The ICF analytical instrument consists of three main elements: design issues, design concepts and design forms, which represent design knowledge by decomposing the design case into independent knowledge categories. The ICF was developed as a computational model rooted in the theory and method of case-based reasoning as formalism for representing conceptual design with precedent knowledge. The ICF formalism is gaining international recognition and has been applied as a medium for knowledge formulation such as the 'Web-based Intelligent Design tutoring System project'. Bar-On & Oxman (2002) have employed the ICF formalism as a conceptual model to represent building technology knowledge. Oxman and Rotenstreich (1997) also applied ICF in the content analysis of digital architecture. Kalay (2004) has pointed out that the ICF formalism could represent the design case explicitly and allows us to retrieve the interrelated relations among design issues, concept and form. Typically a design issue can be formulated as goals or issues of posed design problems; a design concept provides a solution according to the formulated design issues; and a design form represents the solution in the form of design artefact. The ICF formalism offers the chance to analyse the competition, as Oxman (2005) called: 'a content analysis in design'. However, the encapsulating of precedent design knowledge requires a very large number of 'cases' to test its credibility. Due to the time limitation, four case studies and one action research was included in this dissertation. The amount of work needed to thoroughly analyse precedent design knowledge is another factor to be considered. On the other hand, the author strived to select the most representative cases in terms of sustainable urban development and access to relevant document sources.

Kalay's view of the design process is in agreement with Schön (1991), who describes the design practice as a reflective dialogue between the designer and the design situation or issue. This led to the question whether the findings of precedent knowledge flow can be applied in the present case study. From Schön's elaboration of action research, as 'reflection-in-action', and Kalay's view of the design communication process, a framework of research methods is developed for this study, with the aim to provide sound connections between trading zone and boundary object approaches, ICF formalism and action research (see Diagram 1).

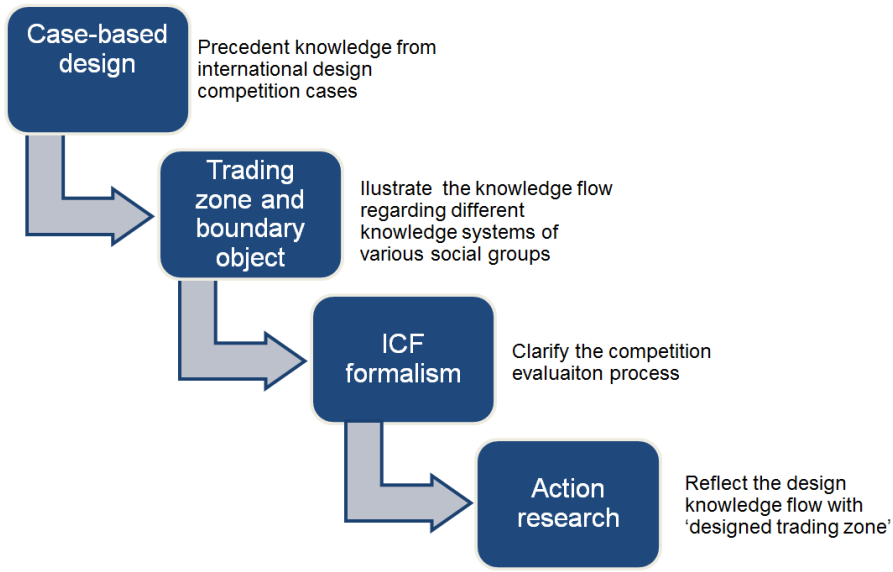

Diagram 1, The connections of research methods in the PhD study.

To analyse such complexity with international design competitions, a heterogeneous methodological framework (Table 1) is applied to better understand the design knowledge flow in the studied cases.

Table 1. The methodological framework.

Phase	**Methods**	**Results**
1 Contextual studies / International design competitions	Literature review, Document/Content analysis, Translations competition documents, interviews and workshop	Systematic overview between Finnish and Chinese large-scale architectural design competitions (the general models and vocabularies of design competitions on large-scale architectural projects between Finland and China)
2 Conceptual framework studies	Literature review, Document analysis, content analysis, workshop	Developing conceptual framework to articulate the findings
3 Analysis and Evaluation: Project case studies	Content analysis (e.g., plans, models, renderings) Context analysis, literature review, document analysis, ICF (design issues, design concepts and design forms), trading zone, boundary objects.	Project case studies (based on conceptual framework of phase 2)
4 Comparative analysis and synthesis	Action research, literature review, document analysis, interviews, semi-structured and structured interviews, content analysis, seminar, workshop	Innovation potentials of synthesis

Note: The anonymity of the interviewees is guaranteed. Only under the agreement of the interviewees is the identity of the interviewees revealed.

2.4.1 Conceptual framework studies

Phase I (see Table 1) will help us to move into a deep analysis and will allow us to articulate the analysis of the competitions. The literature review in this phase includes theories about the conceptual framework. Moreover, the conceptual framework will be further refined relying on literature review and document analysis. The research is based on document analysis and interpretations of data from different levels of sources and archives across city government departments; the official design competition announcement; the competition evaluation public review; and news in the local newspapers, professional forums and official announcements. It is however difficult to proceed with an interview study, due to the complexity of design competitions. On the other hand, there are fruitful publications recording the international design competitions from governmental, professional and public levels. The translations are strictly related to the original sources.

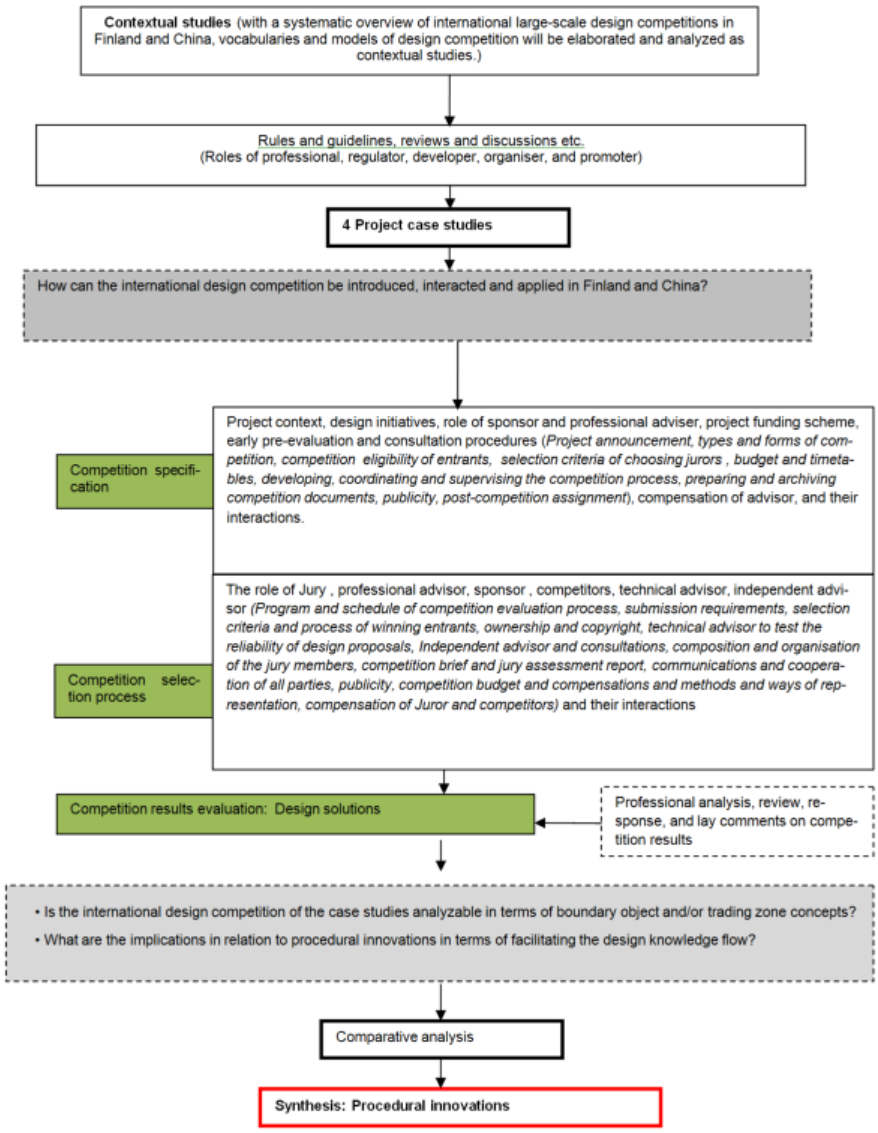

Diagram 2. Conceptual framework of the research

2.4.2 Analysis and evaluation: project case studies

The case study method is a well-established approach (Svengren 1993, Hinnells 1993). Yin (1989, 23) points out that case study as a research method can help to investigate a contemporary phenomenon, 'when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used'. In Phase I (see Table 1), to adequately analyse design competitions, I identified altogether four projects (see Table 2) in Finland and China based on their specific relations to urban development (see relevant publications 2.4.4).

Table 2. Case studies of the dissertation.

CASE 1	International Design Competition of Baietan, Guangzhou in China
CASE 2	International Design Competition of Low2No in Finland
CASE 3	International design competitions of Europan 9 in Finland
CASE 4	International design and planning competitions of Shanghai world Expo 2010

2.4.3 Designed trading zone and boundary objects in the case studies

The analytical concepts of BO and TZ are potentially helpful to understand how the interrelations come about and what they could produce in terms of generating knowledge. The emerging need of redrawing the boundaries of mindsets on sustainability, through interaction of multidisciplinary stakeholders in an international design competition, makes the case studies particularly appropriate for the use of BO and TZ as analytical concepts.

2.4.3.1 Designed trading zone and boundary objects in cases 1 and 2

In the current mitigating-climate-change scenario, a better understanding of the pioneering Low2No design competition, to promote the communication across boundaries and to generate 'inter-languages' as knowledge innovations, is to be established. Hence, it is highly interesting to study the feasibility of the concepts of 'trading zone' and 'boundary object' in elaborating dilemmas and complexity involved in the international design competition of Low2No in Finland, which, like many others, is confronted with a manifold of stakeholders with different disciplines and cultural backgrounds, in need of gaining systematic innovation on sustainable strategy development. To fully exemplify the design-completion procedure and the different roles of Chinese stakeholders and their perspectives on design competitions, the Baietan case was studied, which was chosen due to its specific relationship with the city's strategic plan, its representativeness in using international design competitions in connection to large-scale urban projects in China and its public access to the relevant documentation.

An analysis of the Low2No and Baietan international design competitions will supply us with a pair of lenses to look into the urban project, allowing us to analyze how the design or planning issues are defined, evaluated and connected to the urban development. The theoretical foundation provided by these concepts will enable us to trace the flow of 'inter-language' of the TZ and BO, how boundary objects of international design competitions have been used in interaction, how they have developed and contributed to the emergence of the trading zone, to facilitate mutual 'translation' between actors from different fields. The following questions are to be answered:

- Are the international design competitions of Low2No and Baietan meaningfully analyzable in terms of BO and/or TZ concepts?

The aim is to scrutinize the relevance of generating trading zones in the context of international design competitions and to study the explanatory capacity of the concept in our particular case studies in Finland and China. I analysed how the inter-language is constituted, and how it evolves and is employed during the competition process to clarify the vague nature of the competitions. Moreover, I studied what the crucial factors are in promoting better communication and interaction.

2.4.3.2 Designed trading zone and boundary objects in the cases 3 and 4.

International design competitions have been accepted as tools for accumulating design knowledge in major cities of China (Xu and Cai, 1999; Wu, 2007; Peng and Jiang, 2005; Dai, 2011). Along with the transition to market economy in China in the last two decades, the design task of a construction project is no longer to be given as an internal assignment but to be integrated with the international market. The Shanghai World Expo international design competition is one of the exemplary cases, including three various types of design competitions, such as the idea competition and project competition. In particular, the student idea competition contributed significantly in terms of promoting urban spatial development. Knowledge flows from the various phases of the competition are connected, coordinated and transformed in connection to local conditions. The boundary objects of the competition procedural dynamics will thus be in focus to reveal how and why competition knowledge is synthesized. It is unusual that young talents have the chance to participate in such influential urban projects, which is a different case from the Baietan case. However, the evaluation process was not publicly accessible. It is often questioned whether the jury evaluation processes in most design competition cases of China are corrupted in terms of the so-called 'black deals'.

On the other hand, Finland has a long tradition of using design competitions as a platform to promote knowledge exchange especially for the young professionals. The Europan 9 is an illustrative case to reveal how the competition system and procedure are adopted in the context of Europan institutions in order to promote learning of young professionals. I thus looked into the boundary object of the ideal type – competition evaluation to understand how the competition elevated knowledge in the context of a firm competition tradition in Finland. In order to analyze the textual materials such as the competition announcement, design competition brief and competition report, the research methodology of content analysis integrated with the I-C-F (design issues, design concepts and design forms) was proceeded. It was demonstrated that the evaluation criteria during the competition process possess different degrees of importance, which involved objective and subjective judgments.

The difference between trading zone and boundary object

The BO concept was adopted in the field of urban planning and design in the late 1990s. Henderson (1991) adopted the BO concept on analyzing design activity especially with visual representation such as drawing and diagram, which has put forward the collective work in terms of facilitating the coordination and communication across the boundary groups involved. The concept of BO is closely connected to the concept of 'trading zone' (TZ), introduced by Galison (1997) in the scenario of dealing with the dynamic and evolutionary processes of multidisciplinary interactions.

In order to futher clarify the application of BO and TZ concept, case 3 and case 4 were analysed accordingly. According to the seminal paper by Susan Leigh Star and James R. Griesemer (1989), the following types of BOs were identified from their study of Berkeley's Museum of Vertebrate Zoology: repositories, forms and labels, ideal type or platonic objects, terrains with coincident boundaries. In connection with design competition, four types of boundary objects are firstly proposed as follows, but more are to be identified during the analysis:

- Standardized forms and methods (competition procedures) – provide a shared format with aims of common communications across different disciplinaries. The standardized forms and methods supply structure or language for the cooperation.

- Repositories (competition results synthesis) – public access to a common and indexed reference system of data, measure which provides shared definition or resource for problems of heterogeneity, they have advantage of modularity.

- Ideal type (Competition evaluations: i.e., sketches, maps, drawings, diagrams, models, computer simulations) – representations as a means of communicating and cooperating symbolically, having the advantage of adaptability and disadvantage of deviations due to the vague nature of design quality.

- Coincident boundaries (Competition related project context maps) – these help to clarify the design competition's geographical boundaries.

The theoretical foundation provided by these concepts will enable us to trace how boundary objects of international design competitions have been interacted, developed and if they have constituted a trading zone, to facilitate mutual 'translation' between actors from different fields. The following questions will be answered:

- How are the international design competitions of Shanghai World Expo 2010 and Europan 9 developed, interacted and implemented?

- What findings can be made on the interaction that took place in these competitions when they are analyzed in terms of BO and TZ concepts?

2.4.3.3 The research methods on analyzing the boundary objects of ideal type

Refer to Chapter 3 & 4, the boundary objects of ideal type (competition evaluations on participated design proposals) are critical in the competiton procedurals. In order to fully analyse the design competition, the case 4 was mainly focused on tracing the boundary objects of ideal type. One of the main characteristics of Finnish design competition is the publicly accessible competition report, which offers professionals the access to the competition database and enables knowledge development. The accessible data also helped me to proceed with a case study of the boundary object of ideal type/ competition evaluation.

Since the boundary object of ideal type is mainly concerned with textual materials for recording design competition nowadays, content analysis was employed as the research tool to determine the presence of certain words or concepts in the context of the project and thus classify textual material and transfer it to relevant and manageable data. Content analysis (De Sola, 1959; Weber, 1990; Krippendorff, 1980) was accepted as the main research method to code and categorize various kinds of text materials. The textual documents related to design competition are analysed to reveal its conceptual content, design methodologies, physical features and their various degrees of importance with competition requirements. The empirical material includes design competition brief, jury report and design proposals, which are important records of the design competition evaluation process. Through analysing the key words highlighted in the documents, I am able to explicate the facts during the competition process.

On the basis of systematically examining interaction of different roles, networks and their relations with evaluation criteria, I will answer the following questions:

- What are the factors (objective and subjective) of competition evaluations that affect the result of a competition project and what are their degrees of importance?

2.4.3.4 Comparative Analysis and Synthesis: Designed trading zone and boundary objects in action research

A comparative analysis and summary of the findings from Phases 1-3 (see Table 1) have provided innovative solutions for rethinking the potential roles of design competitions in facilitating design knowledge flow. Action research is introduced at this phase for examining the acquired findings from previous

studies. The action research was designed as a dialogue based competition with participating groups of real estate clients, young and experienced professionals, academics and design managers. The theme of sustainable building and urban development was chosen for the dialogue based competition action research.

The term 'action research' was firstly introduced by Lewin (1946, 206). It was characterized that action research involves 'a spiral of steps, each of which is composed of a circle of planning, action and fact-finding about the result of the action'. The focus of action research is on how knowledge emerges from local situations. It emphasizes that theoretical knowledge and practical knowledge must interact with each other. The definition of the steps and notions is applicable to the general design process. Action research has commonly been applied to capture responses in complex situations (Dick, 1995; Susman, 1983; Altrichter, 1990). The methodology of action research is a process of self-reflective inquiries. As a result, participants of a particular social situation are expected to improve their own practices and gain understanding of their practices and the situation (Carr and Kemmis 1986). Similarly, Altrichter et al. (1990) described action research as people reflecting upon and improving their practices by means of interrelating with both their reflections and their actions. Furthermore, Dick (1995) pointed out that action research is an iterative process conveying a better understanding of the situation. In a way, Dick described action research as a process from '... fuzzy questions → fuzzy methods → fuzzy answers → less fuzzy questions ...' (Dick, 1995, 38). In short, action research is believed to provide a platform for rethinking and refining of data and interpretations in a step-wise fashion.

Schön (1991) addressed the term reflection-in-action in the field of design study, which magnifies the importance of solving problems in practical life-contexts of the professions, by proposing that design activity is a typical example of reflection-in-action. He addressed context-specific design venues such as a project in a design office as suitable contexts for reflection-in-action. The specific design venues can be considered as kind of micro-cultures in his view, which give the chance to reflect on understandings by doing a design. The results of the design products can be considered as the sum of reflective actions in response to the local situations.

Newton and Backhouse (2013, 1) pointed out the potential of competition as 'a two-way process of engagement between academia and industry.' During their 'Future Proofing Schools' project, the competition brief was used as an educational tool for knowledge transfer into their design community in terms of educational practices, design curriculum, and construction environments. Their research revealed the potential of the design competition as 'crowd education.' They announced the competition brief as 'a detailed and educative brief on current issues in pedagogy and space, sustainability and prefabrication strategies' with an online format (Newton and Backhouse, 2013, 3). Moreover, be-

sides the design competition brief other competition documents can also be utilized to teach architects, especially young architects. As concluded from previous design competition cases, the rigidity of the competition format to a certain degree hindered the knowledge flow. In this respect, the flexibility and responsiveness of action research is compatible with analyzing the local coordination process of a themed design competition. The competition participants shall start research by 'forming collaborative, reciprocal, trusting, and friendly relationships between experienced researchers and the subject' (Falzone 2004, 328). Due to time limits, an invited competition was designed to test the author's preliminary assumptions from previous case studies instead of an open call to the design community. Various boundary objects (such as repositories, ideal type and linkage) are designed based on preliminary findings to facilitate knowledge flow. A variety of professional representatives including young architects, local, experienced architects; urban developers; and international academics was invited to join the workshop. The participants included nine men and five women, and their age ranged from 21 to 35 years. Additionally, their professional work history varies from 0 years to 11 years. There was a variety of backgrounds including architecture, urban planning, policy design and construction administration.

Susman (1983) argued that action research can provide changes in local 'concrete situations'. Susman promotes a cyclical process of diagnosing, action planning, action taking, evaluating and specifying. The cycle provided by Susman is comparable to what designers go through in the design process in general. Groat and Wang (2002, 112) further argued that Susman's action-research diagram describes 'the stages of knowledge-finding in a practical concrete context'. In their view, the process is similar to generating a series of figural schemes in a design process, which in turn promotes 'reflecting, renewed attempts at diagnoses, evaluations, decisions to draw in a certain direction' – (ibid.).

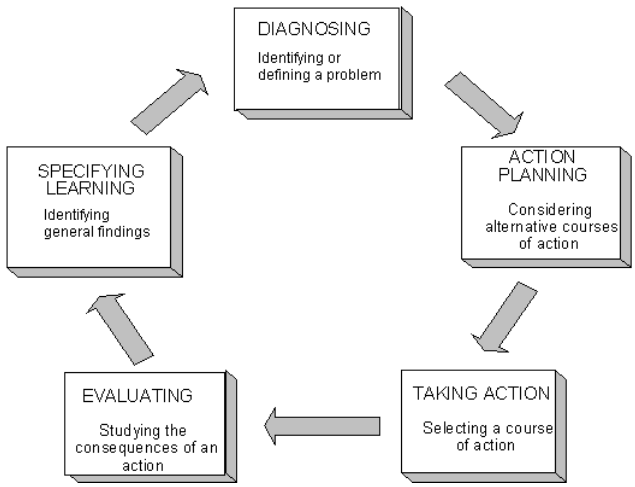

Figure 5. Detailed Action Research Model by Susman. Source: Susman 1983, 102.

Farbstein and Kantrowitz (1991) framed their 'design-decision research' as a more elaborated version of action research, in which the researcher can examine the design-decision making process while being integrated into the actual process. They pointed out that the 'researcher' in their model can be a player, who assesses design decisions from the perspective of research.

In sum, the detailed research design of action research was made roughly based on the action-research model of Susman (Susman, 1983) (see Figure 5).

- Planning: the preliminary diagnosis – the collection and interpretation of data from case studies prior to dialogue-based design competitions.

Questions:

- How to help sustainable design knowledge flow, based on the results of previous case studies?

- Acting: Actions ensure that the participants rethink and criticize the methods and data during the action research. The participants should think about themes: sustainable planning and design; knowledge strategy; indicators and applications.

- Observing: Participants attend the workshop of design competition as a platform for learning with questions of identifying the difficulties of knowledge interaction.

Questions:

- What types of boundary objects can facilitate the flow of sustainable design knowledge?

- Reflecting: Participants develop opinions and rethink the preliminary diagnosis. The academics and experienced architects communicated with the young participants via group and individual discussion and interviews.

2.4.4 Relevant publications

The results of individual case studies were published in journals and conference proceedings (see below).

Publication 1: Rethinking Design Competitions to Promote Urban Development- a Comparative Analysis

Liang, Zheng; 2011. Aalto-yliopiston julkaisusarja. Shortcuts to Sustainable Nordic Communities, CROSSOVER 8/2011, pages p227. ISSN 1799-4977. http://lib.tkk.fi/CROSSOVER/2011/isbn9789526044156.pdf

Publication 2: Contemporary large-scale international design competitions in China, a case study of Baietan, Guangzhou

Liang, Zheng; Mäntysalo, Raine; FORMAkademisk, special issue on Architectural competitions I, Vol 6, No 4 (2013), pages 21, in the year 2013. https://journals.hioa.no/index.php/formakademisk/article/view/745

Publication 3: Competition towards sustainability: a case study of Low2No international competition in Finland
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3 Competition Cases 1 and 2: Baietan, Guangzhou, China and Low2No, Finland

3.1 Overview

Urbanized areas are believed to be crucial to the sustainable development of our living environments, especially in the current mitigating-climate-change scenario. In this respect, the Low2No international competition was recently held in Finland with an attempt to trigger a disruptive change on sustainable development nationally toward a low carbon future. In order to stimulate a systematic change, new competition forms were set rather than following the firm competition tradition in the host country. The Low2No international design competition was expected to not only produce sustainable design solutions, but also serve as a vehicle to distribute knowledge on sustainability. Therefore, the Low2No international design competition was believed to provide a new paradigm of design competitions to promote long term sustainable design strategies in Finland, deserving further systematic research. Herein, the Low2No international design competition has been chosen as a case study due to its pioneering and specific relation to Finnish national sustainability strategy, its representativeness of procedural innovations towards a model of sustainable urbanism.

On the other hand, the international competitions in China in turn could serve as vehicles for coordinating and facilitating multi-cultural interaction, they are adapted to the corresponding social and political background. It varies greatly depending on how the organizer operates the design competition. Until 2010, there were 18 international design competitions calling for ideas on and solutions to Guangzhou's strategic urban development issues (Lv, 2011). I conducted a study on a case with a relatively well-developed organizational and operational system in terms of using the international design competition as a consulting service (Peng & Jiang, 2005) for accumulating design and planning knowledge. One particular high-profile competition for the Baietan region was chosen.

By examining the applicability of analytical concepts of 'boundary object' (BO) (Star & Griesemer, 1989) and 'trading zone' (TZ) (Galison, 1997), international design competitions can be analyzed in order to avoid the so-called 'complicit relationship' of design competition research. Moreover, the procedural innovations of design competitions can be elevated and analyzed based on the BO and TZ approach. The analysis on a magnitude of relevant documents, including design completion regulations, procedures, issues, the different roles of stakeholders and their individual perspectives, is to be introduced by tracing the development of BO and TZ alongside the whole Low2No and Baietan international design competitions.

Questions on how the design and planning issues are formed, interacted and solved were answered. The factors that affect the competition process through the Low2No and Baietan international competitions are identified and summarized as preliminary findings. In the case studies, the analytical potential of the concept of the trading zone is examined by analyzing how the interlanguage of the design competition was constituted, how it evolved and how it was applied.

I started with elaborations on the Baietan and Low2No cases, emphasizing how international design competitions were set up, and how they interacted and developed. The comparative perspective has then been introduced, revealing the specific model of interaction with professionals, governments and the public in terms of urban development. In the final part, the preliminary findings are discussed and relevant implications are drawn.

3.2 Case study 1: Baietan, Guangzhou, China

3.2.1 The international design competition as a consulting service to advance strategic planning in Guangzhou

Guangzhou is the third largest city in China and it is one of the five national central cities[14]. The national central city (NCC) concept was proposed by the Ministry of Housing and Urban-Rural Development to the reform in 2005 in order to regulate the rapid urbanization in China. Zhou (2012) argues that the Chinese NCCs are based on economic zones and subordinate cities and function as regional economic centres. National central cities are capable of leading, impacting and accumulating political, economic and cultural development.

[14] The five major cities are Beijing and Tianjin in the Bohai Economic Rim, Shanghai in the Yangtze River Delta Economic Zone, Guangzhou in the Pearl River Delta Economic Zone, and Chongqing in the West Triangle Economic Zone .

Along with China's reform from a planned economy to a market economy since 1979, the competition among cities and regions in terms of opportunities and resources has been increasing especially regarding the NCCs. Wei & Zhao (2009) state that unregulated urban growth has led to difficulties in developing central urban areas (Figure 6), while the conventional master plan approach has not been able to provide urban spatial development guidance.

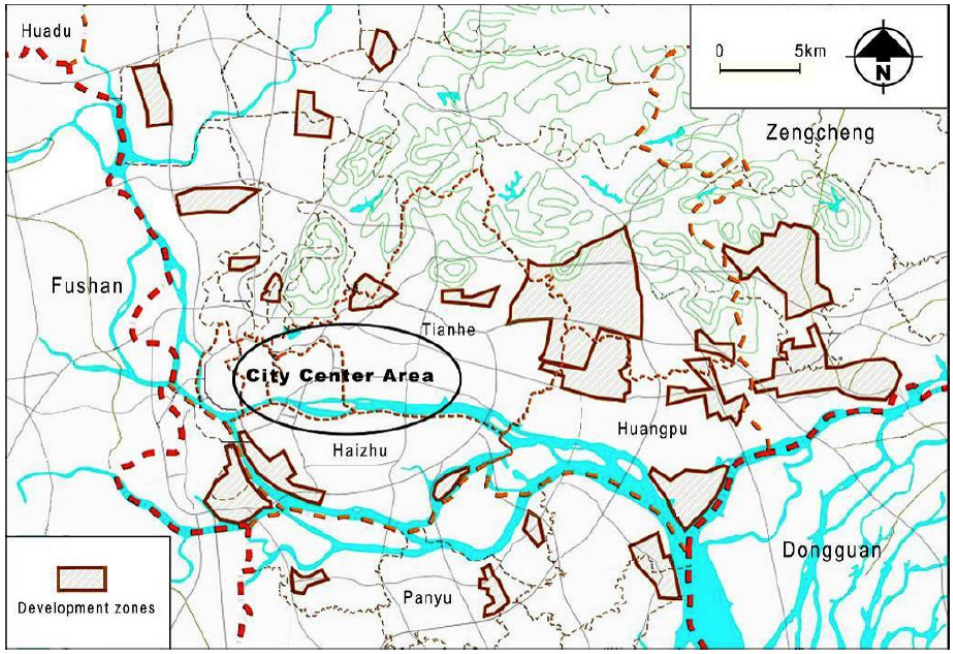


Figure 6. The distribution of development zones in Guangzhou in 2003. Source: official site of Guangzhou Planning bureau

3.2.2 Strategic planning in Guangzhou: The dynamic of consultation-competition-synthesis

Xu and Yeh (2003) note that the declining role of Guangzhou City and its unregulated growth have pressured the city to devise new planning initiatives for new urban development in order to enhance the city's future competitiveness. Based on the comparative study of planning systems in England, USA, Germany, Singapore, HongKong and Japan, certain similarities have been elaborated. The results have emphasized the importance of developing strategic planning to effectively regulate the rapid urbanization. From June to September of 2000, the Guangzhou City planning bureau invited five national top planning institutes[15] to consult the urban strategic development plan. This was considered as the first attempt among the provincial capital cities to consult profes-

[15] The Chinese Academy of Urban Planning and Design, the Institute of Urban Planning and Design of Tsinghua University, the School of Architecture and Urban Planning of Tongji University, the Centre of Urban and Regional Research of Zhongshan University, and the Guangzhou Academy of Urban Planning, Survey and Design.

sional institutions on strategic planning. Followed by the experts' consultation together with the government, it resulted as the 'Guangzhou overall urban strategic plan'. The plan aims to develop Guangzhou as an international polycentric regional metropolis and Shanshui[16] eco city, with a spatial strategy of expanding the south, optimizing the north, advancing the east and coupling the west (Figure7, 8). The 'Guangzhou overall urban strategic plan' has guided 'the development of city master plan, land use plan and district urban design of Guangzhou' (Lv, 2010, 23). The strategic plan has played an important role in regulating the rapid urbanization, aiming to transform the city from an industrial town to an international metropolis.

In 2007, the spatial strategy of 'adapting the middle' was added with respect to the transition of the economic development model. In 2012, the spatial function was specified as 'one metropolitan area, two new city areas, and three subcentres'[17] (Figure 9, 10). As Lv, responsible for the development of strategic planning of Guangzhou, notes[18], the spatial strategies emphasized the transition from external development to internal improvement. The change of strategic planning to a certain degree reflected the economic guideline of the central government on internal economic growth instead of exporting.

[16] Shanshui is a Chinese concept which represents reserving mountain and water geographic characteristic of the landscape
[17] See the government report:
http://english.gz.gov.cn/publicfiles/business/htmlfiles/gzgoven/s9068/201203/906488.html retrievable on 28th, April, 2014.
[18] See the professional forum : http://www.cityup.org/news/urbanplan/20130626/97888.shtml , retrievable on 28th, April, 2014

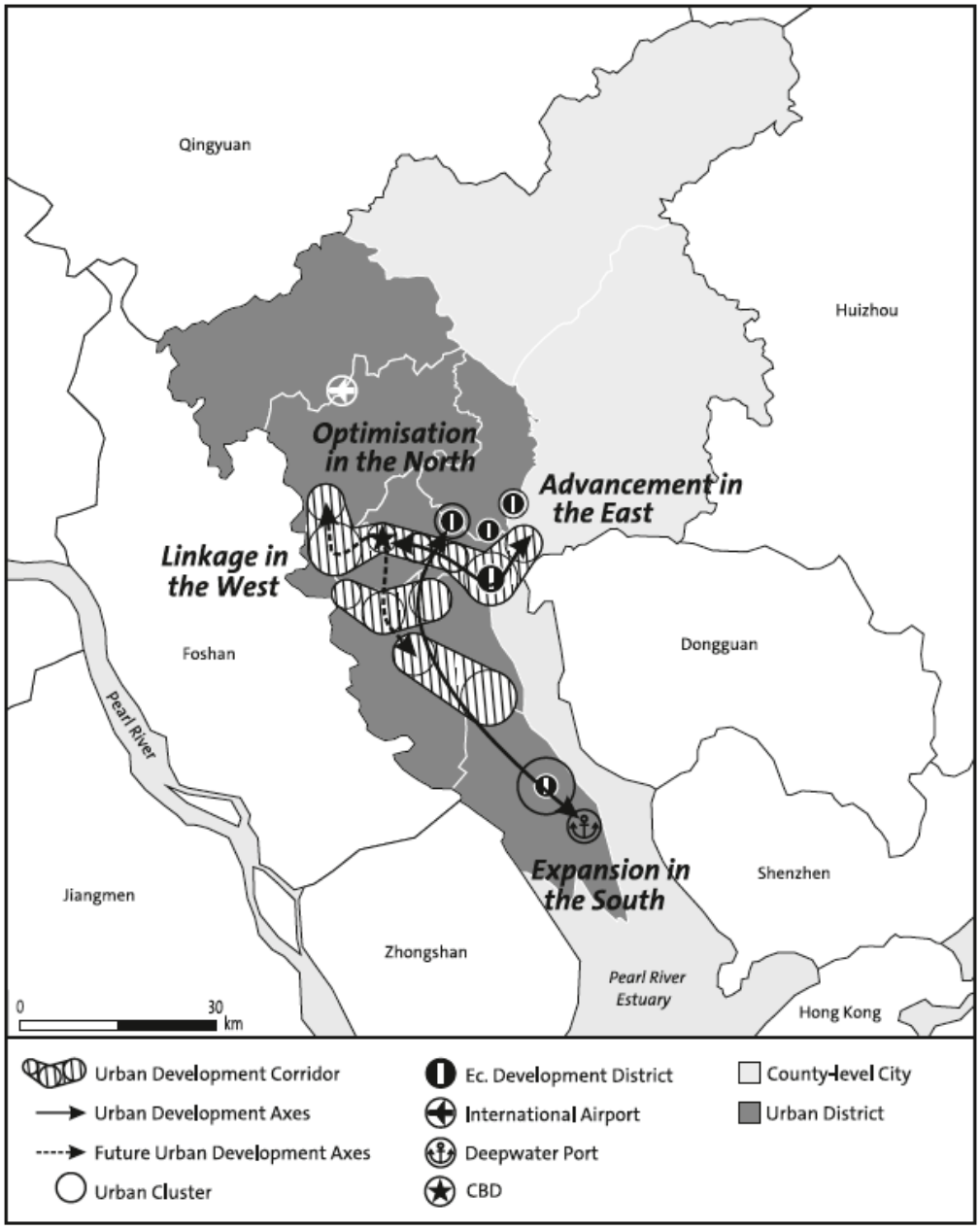


Figure 7. Strategic urban planning of Guangzhou City, 2000.
Source: Waibel and Schröder 2011, 52

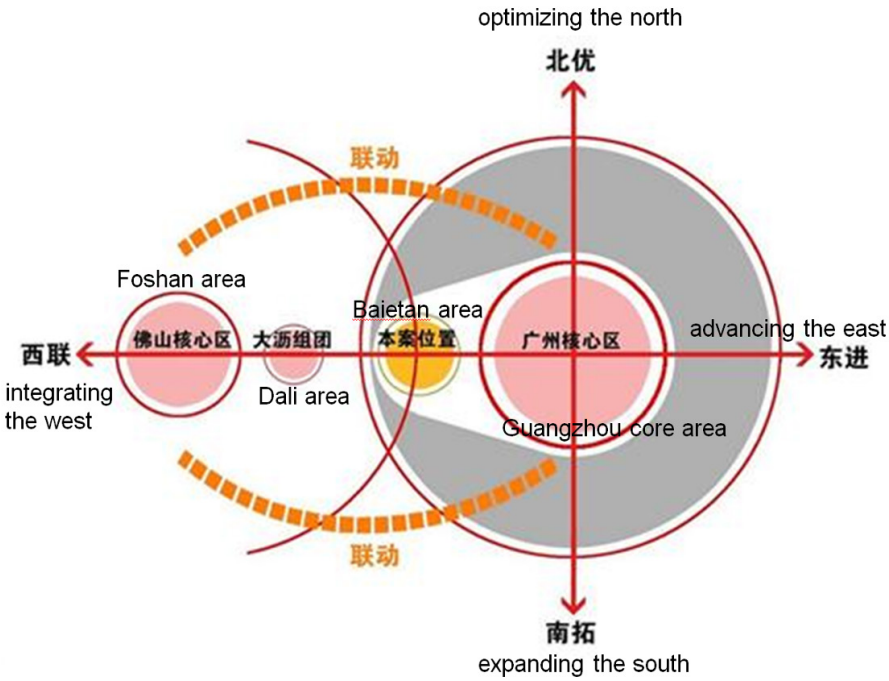


Figure 8.A systematic illustration of the strategic position of the case study area: Baietan. Source: Design proposal of the School of Architecture and Urban Planning of Tongji University, Shanghai.

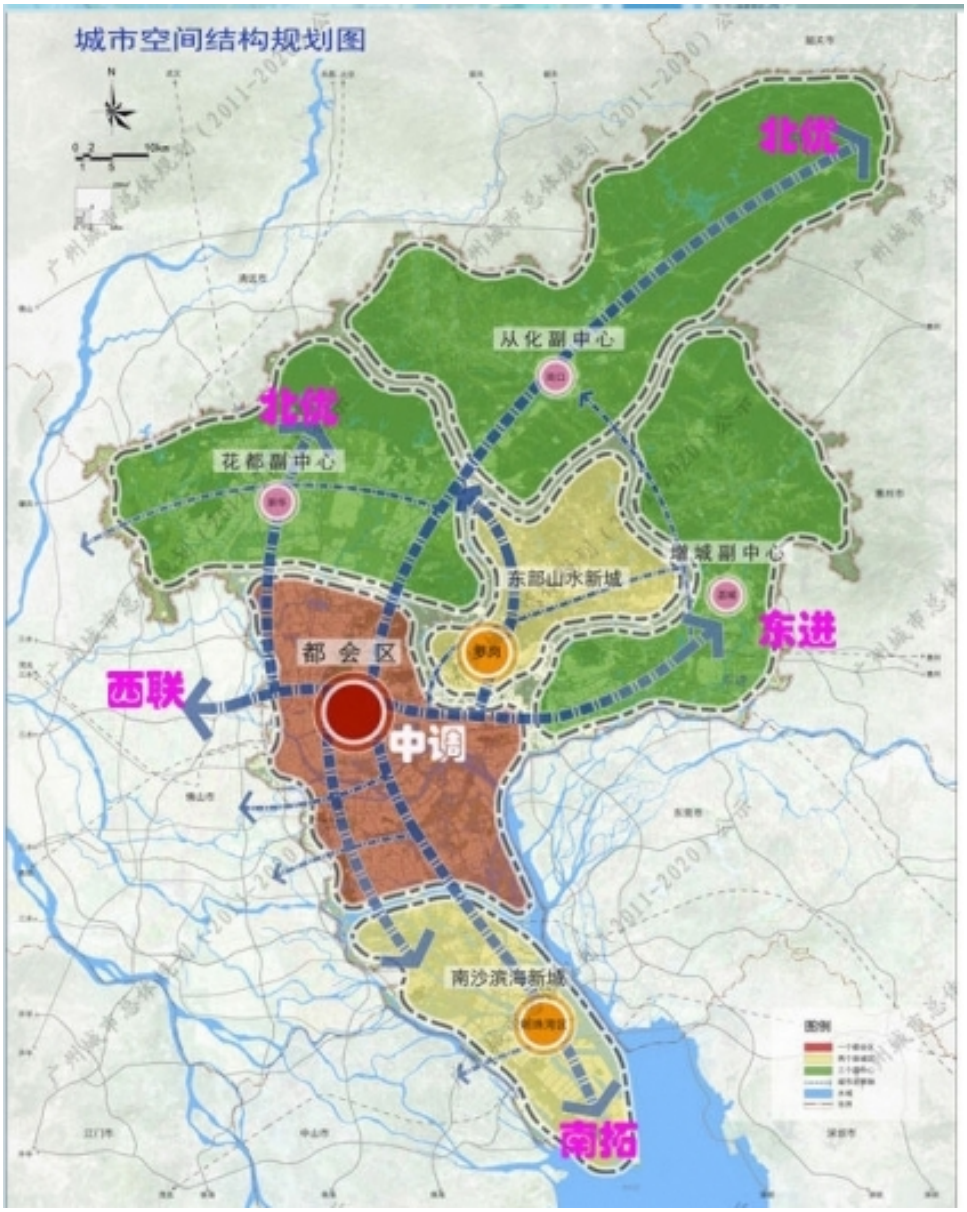


Figure 9. The master plan of Guangzhou City 2011–2020.
Source: official site of Guangzhou Planning bureau

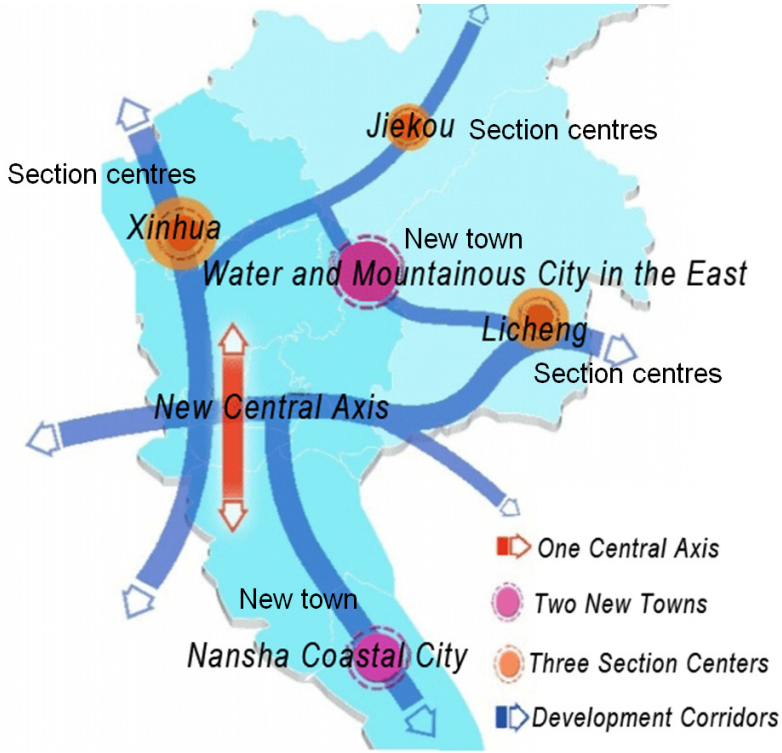


Figure 10. The master plan of Guangzhou City 2011–2020.
Source: official site of Guangzhou Planning bureau

From March to July 2007, the same five national design institutions and Guangzhou regional planning and design institution were invited to consult the strategic planning development. In September 2007, based on the six submitted proposals and consultation with experts and public authorities, the 'Guangzhou overall strategic urban plan 2010–2020' was set up. Lv (2010) pointed out that strategic planning served as the main guideline for land use planning, regional planning and spatial planning of Guangzhou. After years of effort, 'one metropolitan area, two new city areas, and three sub-centers' with different functions as motors of spatial development were proposed and scheduled to be built in the next decades, as illustrated in Figure 8. There have been around twenty international design competitions held to call for ideas and solutions on developing these new proposed centres.

As Lv (2010) points out, strategic planning of Guangzhou has emerged as a method to deal with the dilemma of regulating rapid urbanization, overcoming the limitations of conventional planning tools. Design competitions have served as platforms for accumulating and exchanging knowledge, and they have resulted in institution upgrading and knowledge innovations. The setting up of the Guangzhou overall urban strategic plan 2010–2020 was a result of rounds of consultation with national top professional institutions, experts and governors. There were two design competitions involving the national professional institutions. The main setting of the strategic planning structure result-

ed from the first round of design competition consultation in 2000, when the stakeholders of urban development of Guangzhou reached a consensus to introduce professional knowledge for the improvement of the city's competitiveness in the hard competition between national central cities. Moreover, the dynamic on 'consultation competition synthesis' continuously updates the urban spatial structure. In other words, the strategic plan development has been continuously changing with the emphasis on improving economic competitiveness.

3.2.3 The Baietan international design competition

Arranging international design competitions was seen as an essential tool to accumulate design excellence for promoting urban development in Guangzhou. The core of the international design competition of Baietan, in 2008, was a simplified conception of the urban redevelopment scheme, which aimed to redefine the city boundary.

The Baietan area is a strategically important western gateway, functioning as a new symbolic area and a new commercial centre. To better promote the future of the Baietan area, a two-stage design competition was held. According to the official announcement, in the first stage, ten qualified teams (based on their draft design proposals, professional experience, design team members, previously accomplished projects and service credibility) were selected to send in their official design proposals. It was mandatory that the participating teams had to have nationally specified qualifications or constitute a qualified team with a domestic design partner. In the second stage, from March 11 to June 27 of 2008, they were to get 800,000 RMB (tax included) as compensation if their proposals were to be approved after the technical evaluation. Two winning proposals would be selected and the runner-up was to be compensated with 200,000 RMB as award money. On July 9 and 10, 2008, proposals No. 2 and 5 were announced as the winning entries (Figures 11 and 12) from six qualified design institutions[19]. Shortly after the competition, important local officials, including the mayor, the first deputy mayor, the vice mayor and the secretary of the municipal party committee, visited the exhibition of the competition proposals and made their comments on the further development of the master plan. They suggested the commissioning of an international first-class consulting company to make an independent evaluation of the design proposals and suggest the next steps. In February 2009, the international design firm SOM (Skidmore, Owings & Merrill) from the USA was appointed by the government as the contractor to synthesize the competition results and further refine the urban design on a more detailed level.

[19] The Shanghai Urban Planning & Design Research Institute; Guangdong Urban & Rural Planning and Design Institute and KD Architects Singapore; Shanghai Tongji Urban Planning Design Institute and Guangzhou Urban Planning & Design Studio; Architecture Design & Research Institute of SCUT and Guangxi Hualan Design & Consulting Group; China Academy of Urban Planning and Design; Guangzhou Urban Planning & Design Survey Research Institute and EDAW Shanghai.

Figure 11. The winning design proposal 2 of the Baietan design competition.
Source: The Urban Planning Bureau of Guangzhou

Figure 12. The winning design proposal 5 of the Baietan design competition.
Source: The Urban Planning Bureau of Guangzhou.

Figure 13. Final regulatory plan of the Baietan area, Guangzhou.
Source: The Urban Planning Bureau of Guangzhou.

The Baietan area was approved as the 'heart of Guangzhou and Foshan', as an 'international business center' and as the 'Shanshui liveable city' in the final regulatory plan (see Figure 13). In February 2010, the plenary meeting of the governmental standing committee was held to review and approve the final master plan. On November 5, 2010, the results of the regulatory plan were reviewed by the urban planning committee. On June 8, 2011, another plenary meeting of the governmental standing committee was held, and the final regulatory plan of Baietan was approved. Especially, a 600-metre-high building was proposed as the highest landmark for Guangzhou. However, in April 2012, after the succession of the district government leadership, the approved planning and design of Baietan were put under another round of modification. On June 26, 2013, the name of the Baietan urban planning and design project was officially coined as the 'Huadi (Flower Village) eco city plan', and the planning content was modified by the planning committee of Guangzhou. A three-kilometer-long waterfront area and a 500-metre-high landmark will be con-

structed (Baietan Administrative Committee) [20]. The approved 'heart of Guangzhou and Foshan', the 'international business center' and the 'Shanshui liveable city' were further modified to the 'international water-fronted business centre' and the 'western hub of the metropolitan area'. The Baietan international business center was regarded as the start-up zone of the Huadi (Flower Village) eco city.

Figure 14. The rendered graphic of Baietan business centre as a start-up zone of the Huadi (Flower Village) eco city, Guangzhou, 2013.
Source: The official site of the LW government, Guangzhou.

3.3 Interpretations

The evolution of inter-language on procedures, design issues and regulations in the Baietan international design competition, China

In the case study of Baietan, the technical document (see Diagram 2) served as the main document to instruct the competition process including the technical and standard articles: The technical article presents the design guidelines with a focus on design principles, which are carefully examined by studying the project context, related urban planning policy, project feasibility study, design regulation and related documents. The standard articles specify the responsibilities and obligations of stakeholders involved with a connection to national and international legislation; they aim to create a fair competition environment. The technical documents serve as both the competition brief and rules, referring to the Finnish model. The competition consulting committee constitutes the core of coordination and communication during the competition pro-

[20] From online official news:
http://www.lw.gov.cn/lwq/baietjs/201311/340bcc833a734ba9af0eaa142f3457d1.shtml

cess. It integrates the language of legislation, design, technical feasibility and management to instruct the design competition. The procedure can be understood as a framework or as an example for the local translation of international urban planning and design knowledge.

By reviewing the project context and flow at the design competition specification phase of the Baietan case, the design and planning issues were specified mainly as follows:

The initial function of Baietan area is the central area of 'Guangzhou and Foshan metropolitan circle', the motor of 'coupling the west', the new landmark area of the western city and new central business area. The foci are the headquarters economy, modern service such as logistics, creative industries, business & trade and historical tourism and certain residential functions. The contributing units should highlight the layout of 'shanshui eco city' and 'historical culture city' based on the in-depth analysis of the future role of Baietan in the context of urban social-economic development; conserve the original river environment of 'clean water & fragrant flowers' and highlight the concept of liveable city, following the planning standard of the modern city business and trade area; develop the geographical advantage, integrate the city with bridge and tunnel construction crossing the Zhujiang River; the design should have high profile, express new thinking, following zoning instructions, represent an integrated design concept to ensure the integration of landscape and control. (From the design competition announcement, not including the detailed requirements for urban design)

From the official documentation of the competition results (Lv, 2011), the winning proposal No. 2 was singled out due to its structural idea of 'one region, one axis, two cores and ten sections', which responded to the design requirement of 'following zoning instructions, represent an integrated design concept to ensure the integration of landscape and control', in its design strategy of setting up 'a central office service area, highlighting cultural assets and creations, shaping a liveable residential area and fostering eco leisure' and focusing on 'headquarters economy, high-end service, cultural and creative industries and leisure tourism', which was also closely related to the focus of 'headquarters economy, modern service such as logistics, creative industries, business & trade and historical tourism and consider certain residential function' from the design announcement. Moreover, proposal 2 was regarded to correspond closely with the overall strategic planning of 'coupling the west' and 'central area adaption'. On the other hand, proposal 5 is highlighted as an 'eco and central intelligent city'. Based on its thorough analysis of the context and geographical design, the planning concept of 'organic integration' was introduced as a response to the design requirement to 'develop the geographic advantage and future function of Baietan'. The functional idea of proposal 5 was defined as a 'central intelligence district of the metropolitan area of Guangzhou and Foshan with international impact', which also follows the ini-

tial function of the Baietan area as a 'central area of Guangzhou and Foshan metropolitan circle'.

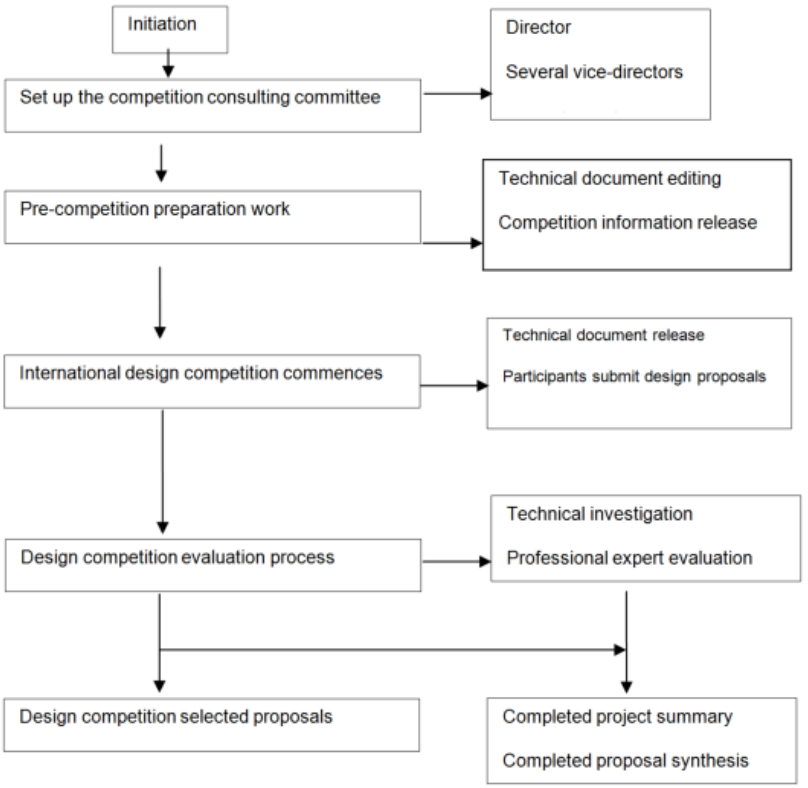


Diagram 3. The project workflow of the international design competition in Guangzhou. Source: Peng & Jiang, 2005, 2.

As can be concluded, the evolution of inter-language from both proposal 2 and 5 is closely integrated into the design initiatives of the organizer, which were set in the framework of the spatial function of the Baietan area. The inter-language of the regulatory plan in 2011 of the 'heart of Guangzhou and Foshan', an 'international business center' and a 'clean water & fragrant flowers liveable city' can be considered as an integrated outcome of consultations from a series of design competitions. The generated inter-language enriched the urban planning and design language in the field towards sustainable development and constituted a trading zone towards better communication. The invitation of the international design firm SOM from the USA as an independent consultant to synthesize the competition results shows the willingness of the government to make a power shift. However, through the substantial change towards an 'international water-fronted business centre' and a 'western hub of metropolitan area' along with the governmental succession in 2013, it shows the strong role of the governmental initiatives in the use of inter-languages. Under the new definition of the 'western hub of metropolitan area', the spatial function of Baietan area has been substantially altered. In the network plat-

form[21] for consulting governance, it was argued that the new plan has lowered the strategic importance of Baietan, and it was further pointed out that the concept of the 'eco city' is similar to other project concepts: 'the local planning professional seems poor in vocabulary now'. However, at least new design and planning concepts towards sustainable development have been published and discussed.

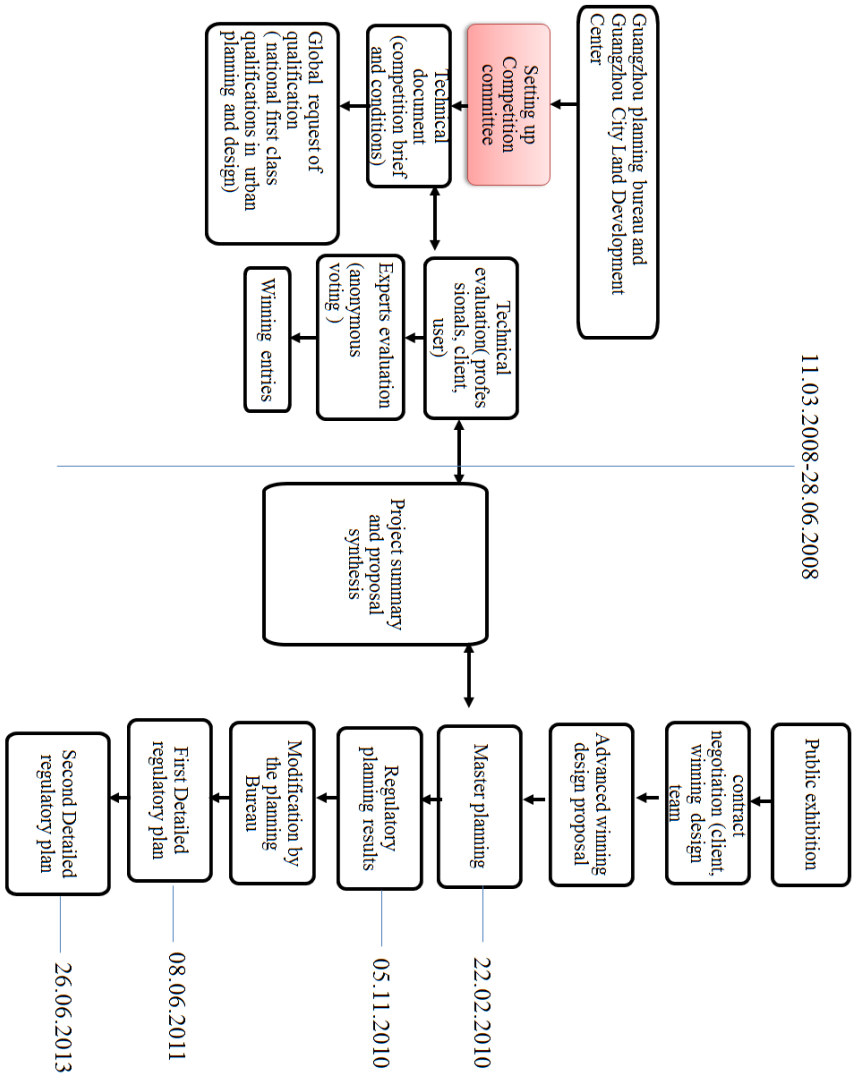


Diagram 4. The procedural analysis of the international design competition of Baietan.

In the Baietan case, the competition process is generally similar to the general competition process in Finland (see Diagram 3). During the pre-competition phase, design issues were produced and tested mainly with the national design

[21] From the online platform: http://wz.nfdaily.cn/Content/138412.htm

competition in 2000, with the aim of improving the competitiveness of the city as a national central city. During the competition phase, the inter-language that is generated is closely responded to with the design requirements with the consensus of the jury and technical experts at the professional level. Up to the post-competition phase, an online public exhibition is organized. However, the participating bodies are required to have national first-class qualifications in urban planning and design. The chance for young professionals to participate is still limited. Stakeholders involved in the competition are still confined to the elite class. Competition proposals and results are exhibited and are open to public evaluation, but the jury report is still not publicly accessible.

As Galison (2010, 44) states: 'Images, symbol systems, calculational and diagrammatic schemes – even complex objects – could be part of a generalized notion of language that is far from 'just words' in the trading zone'. Through our analysis of the procedures, design forms and regulations, I found that the Baietan case in Guangzhou not only served as a platform for promoting multicultural communication among the stakeholders mainly in the elite class, but was also deemed as a 'design trading zone' with an evolving inter-language, which is closely related to the social, political and economic settings in China. However, the 'inter-language' is fragmentary without a solid basis.

3.4 Case study 2: the Low2No international competition in Finland

Design competition initiatives: a platform for stimulating systematic change

The architectural competition system in Finland is administered by the SAFA and accepted as a common method to evolve innovative and qualitative proposals. From 1876 on, many well-known projects, such as the Parliament House and the Helsinki Main Railway Station, arose from design competitions.

In Finland, two-thirds of the greenhouse gas emissions originate from fossil fuel usage in the energy production sector (Nenonen, 2010). With ambitions of transforming Finland into a carbon neutral country, it was recognized [22]by SITRA – the Finnish Innovation Fund – that a systematic change from the social, political and technological perspectives is inevitable. With the international opening of the pre-qualification process on participants, new competition forms were introduced to provide opportunities of rethinking the current sustainability strategy through designing a sustainable city block in Helsinki, Finland. As presented in the competition brief: 'We hope that a model of sustainable urbanism emerges from the proposals that will not only serve the City of Helsinki and its inhabitants, but more broadly, be a learning model for de-

[22] An interview with Esko Aho-the former leader of SITRA: 'We [SITRA] recognized that most of the changes required now are systemic… The need now in Finnish society is not related to technological capacity or to skills, but how we use them and take full advantage of them.' – Bechthold & Kane (2011,5)

velopment globally'. The Low2No international design competition was supposed to generate replicable solutions for radically sustainable design, leveraging its reputation and institutional knowledge of private industry and government and eventually triggering systematic changes towards a low carbon society in Finland.

The competition site is located in Jätkäsaari, one of the large redeveloped areas with an area of 100 hectares, following the relocation of Helsinki's port facilities to the eastern edge of the city in 2008. The aim of the competition is 'to design a large building complex on an approximately 3/4 hectare site on the reclaimed goods harbor at the western edge of Helsinki's central business district'[23]. The location of Jätkäsaari city block came out from rounds of negotiations. After meetings with Helsinki's mayor, deputy mayor, real estate and the planning department, the requirements for the Jätkäsaari city block were significantly loosened to meet the needs of the competition. On December 11, 2008, the city council voted to give SITRA the corner block of the Jät-käsaari area.

The interrelations of stakeholders were rather complicated, as the organizer – SITRA – was determined to trigger national systematic change by stimulating knowledge input by introducing a new form of international design competition, the Low2No project. However, the external knowledge input not only requires preconditions of incubation but also transformation in connection to local conditions.

Professor Martin Bechthold from the Harvard Design School has made a case study (Bechthold & Kane, 2011) of the Low2No competition. 52 interviews with stakeholders were conducted and compiled into a mass of data to uncover what really happened.The results of his case study supplied good basis for analysing the Low2No case.

[23] As quoted from the design competition brief of Low2No competition. Retrieved 26 Nov. 2013 from http://www.low2no.org/pages/resources

Figure 15. Jätkäsaari goods harbour, courtesy of Suomen Ilmakuva Oy.
Source: Low2No competition brief,2

3.5 Interpretations

The evolution of inter-language on procedures, design issues and regulations in the Low2No international design competition, Finland

From the case of Low2No, as is shown in Diagram 4, with a review of the general contemporary design competition process in Finland, it is revealed that the design competition is well regulated and documented in the competition system. With the assistance of professional or technical advisors, the competition sponsor defines the brief scheme and the ultimate objectives of the competition, generating the initial vocabulary of the design competition. The professional or technical advisor is also responsible for assisting in the selection of the jury board and setting up the procedural rules (competition conditions), which are to be obeyed during the competition process. Design issues, visions, hypotheses and their related resources are produced and tested during the process. During the competition phase, the jury determines the qualities in the competitors' entries and selects winners according to the selection criteria specified in the project program document/competition brief, aiming at consensus at the professional level. Up to the post-competition phase, the competition report is published and evaluated by the public or other stakeholders, leading to a new hybrid vocabulary. In particular, it is required that the jury

panel shall write a report including: 'a description of the competition task, a general evaluation of the competition, entry-specific evaluations of all competition entries, a decision on the distribution of prizes and reasons for the decision, a recommendation for further action, possible dissenting opinions, possible expert opinions, and essential pictorial and textual material relating to the entries' (SAFA competition rules, 2008, 4). Most of the jury report is publicly accessible, contributing to a forum for further debate and communication From Finland's Architectural Policy (Finlands Arkitekturpolitik, 24), 1998: 'Competitions are a complementary form of education and open up possibilities for new planners. The large number of solutions presented for competitions makes it easier for people to discuss alternative possibilities for developing the environment'. The transparency and openness of design competition resources offer a platform for the interaction with the public. In particular, it opens up the chance for young professionals for learning and practicing.

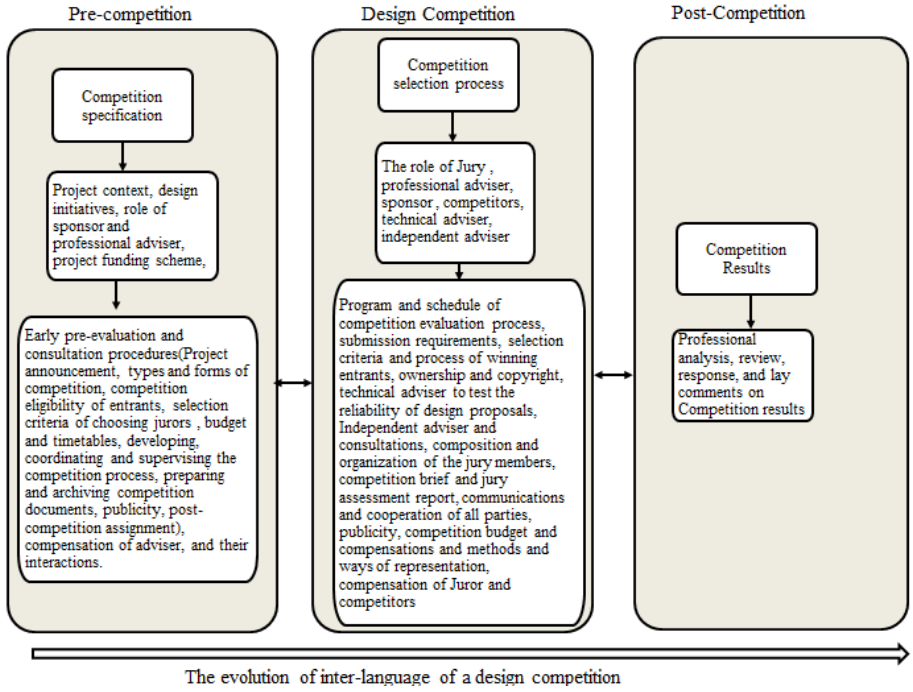


Diagram 5. The general competition process in Finland.

The evolution of inter-language on competition rules, brief and request for qualifications of Low2No international design competition, Finland

In order to promote systematic innovations, new forms of competition were specified by SITRA: '…people to redraw the boundaries of how they think, and reposition their skill sets. (…) Without it you will have a competition that is all about what is already known, and the standard format with standard results.'[24]

[24] As quoted in the Interview with Steinberg, 11 Feb, 2011-Bechthold & Kane (2011,8)

The intention of redefining the boundaries of mindsets on sustainability is challenging with respect to the propounded competition tradition in Finland.

New competition rules were set for facilitating the scopes of the Low2No international design competition. With a review of competition rules of SAFA, the rules for Low2No emphasized the type of competition as 'sustainable development competition which has a significant architecture component'[25]; the fulfillment of requirements of public procurement legislation was also highlighted. The competition was publicly announced both regarding the design objectives and the process.

Kazemian and Rönn (2009b, 6) argue that the competition system in Finland is one of the most effective in the Nordic countries in terms of implementation, based on a research of architectural competitions carried out during 1999-2000, which highlighted the strong competition culture of consensus among jurors and considered 'disagreements among the jury members in the final statement as something dangerous that have to be avoided'. In the new rules concerning the Jury of competition, the requirement of the level of agreement of the jury panel is changed from 'a quorum shall be formed by the entire jury panel' of the SAFA rules to 'a quorum shall be formed by 2/3 of the jury' of Low2No rules' to increase the tolerance of advancing, innovative yet somehow controversial proposals, which considerably deviates from the competition tradition in Finland.

Moreover, the requirements on the composition of the jury are relaxed in the new Low2No rules, as the SAFA competition rule of 'At least 1/3 of the judges must be professionals in a relevant field[26], and a proportion of these must be independent experts', is removed. A technical expert evaluation from the Helsinki University of Technology was proceeded to evaluate the feasibility of design proposals and presented to the jury. Eight individuals constituted the jury and three of them were academic experts from the United States.

In the section of adjudication of the competition, the requirement of 'an entry which deviates essentially from the binding design requirements, as set out in the competition conditions, cannot be awarded a prize in an open competition, but it can be purchased' was also removed in the new Low2No competition rules in order to leave more space for the design innovations. Moreover, a study trip to sustainable example projects in California was organized to raise the awareness on sustainable design.

[25] Quoted from the international low2No design competition rules, p1

[26] A professional is here defined as:
- a person who is a qualified architect or who has the qualifications set out in the Land Use and Building Act and the orders issued by virtue of it, or
- a person with an education which, in the case of an open competition, has been approved by the SAFA competitions council, or, in the case of an invitational competition, by the SAFA competitions secretary. Such a person must be sufficiently qualified to evaluate the designing task. – (SAFA competition rules, 2008,3)

The form of competition was specified as two-stage with an open request for qualifications (RFQ) and continuation of the best team selected from the RFQ started from March to April 2009. In the first stage, 74 entries from 23 countries were received, out of which 5 finalists were selected to propose further sustainable development strategies. The 'multidisciplinary team expertise' and 'systematic thinking' were highlighted with a wide 'interdisciplinary competency' in the RFQ, which deviated from the Finnish traditional competition practice.

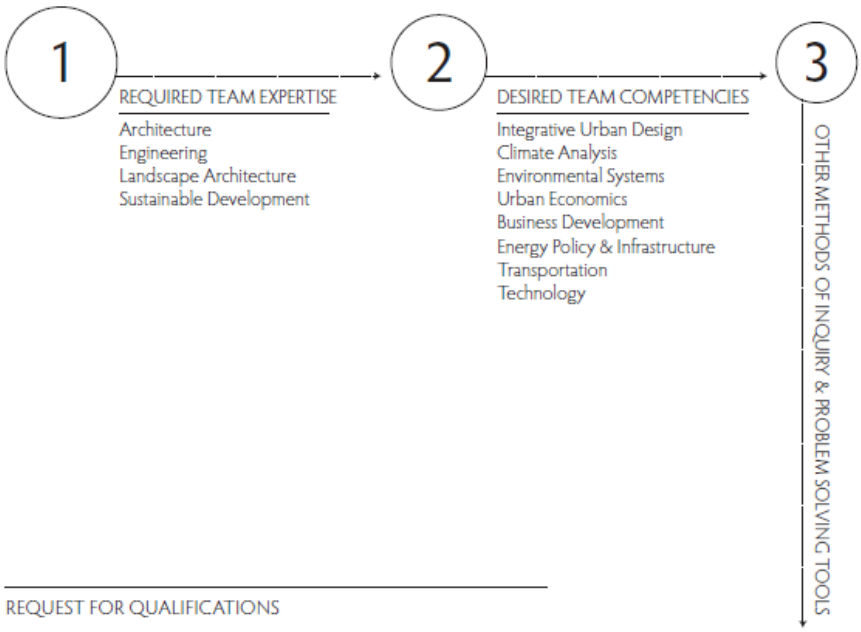


Figure 16. The criteria of RFQ. Source: Low2No competition RFQ,1

In the Finnish procurement legislation, it is required that the jury evaluation report should be publicly accessible. A committee within SITRA reviewed and scored the respondents based on the following minimum criteria: 'Quality of the team 0-40 points; Experience of the team members 0-40 points; Evidence of systemic thinking 0-20 points'[27]. It was pointed out that these interdisciplinary criteria could 'exclude Finnish practices, in favoring international teams' (Bechthold and Kane, 2011, 11). After the first stage of RFQ, none of the five shortlisted[28] teams from the RFQ was from Finland, which led to considerable controversy in the host country. Some Finnish architects argued the feasibility of promoting Finnish knowhow without involving Finnish experts (Bechthold

[27] The competition RFQ documents, p3.
[28] There were Arup (London), BIG (Copenhagen), REX (New York), Rose & Partners (Cambridge, MA) and WSP (London).

& Kane, 2011). In the end, three of the finalists involved a Finnish firm in their consortium (see Figure 17). SITRA deduced[29] that the integration of external knowledge can trigger the national systematic change instead of following the traditional local design culture. The international five finalists included expertise from various disciplines, covering investment consultants, transportation, customer behavior, design, engineering and planning fields (Figure 17).

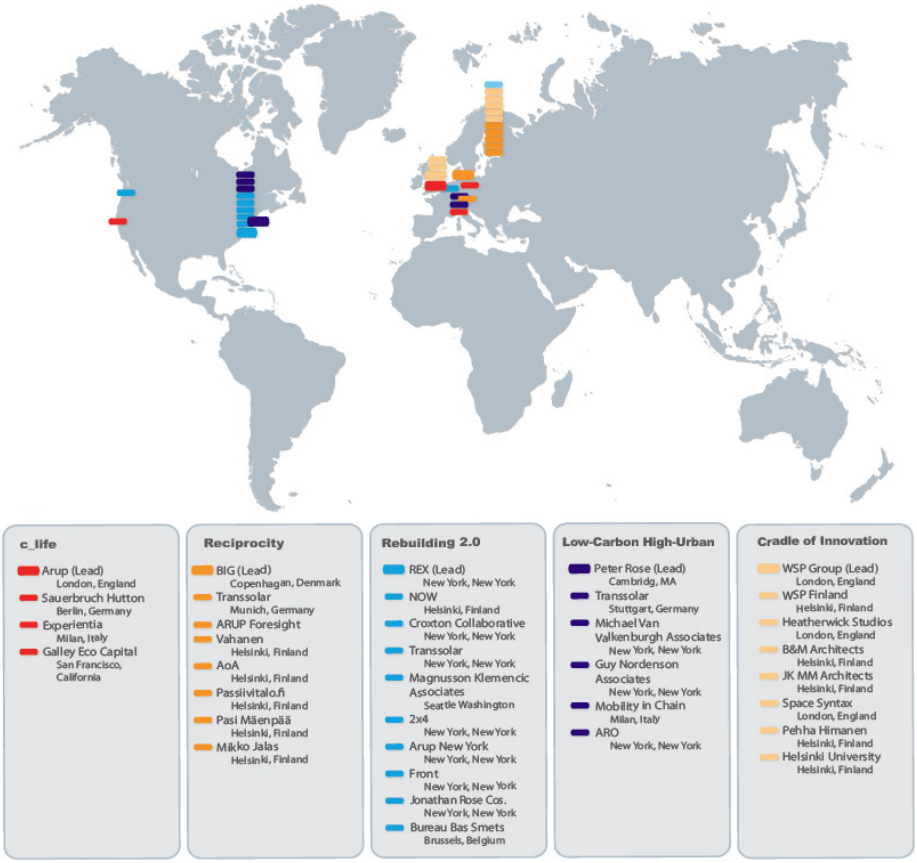


Figure 17. The composition of five finalists. Source: Bechthold and Kane, 2011, 12

Notes: Arup (London)

•BIG (Copenhagen)

•REX (New York)

•Rose & Partners (Cambridge, MA)

•WSP (London)

In order to foster a comprehensible design proposal, four central design objectives are highlighted in the competition brief for the second stage: 'energy effi-

[29] 'Systematic change was bound to come from outside, with SITRA acting in its natural role as translator and mediator between languages and cultures', quoted from the interview with Steinberg, 11 Feb., 2011- Bechthold & Kane (2011,11)

ciency; low to no carbon emissions; high architectural, spatial and social value; sustainable materials, methods & operations'[30]. The broad defined design concepts of low carbon design were set up in order to trigger potential systematic changes. As shown in the title of the competition, the Low2No represents a strategic meaning of transition from low carbon to a carbon neutrality situation. According to Mr. Justin Cook – the sustainable design lead – who helped to shape the design objectives of competition, the focus on the carbon design objective will supply connecting points to systematic innovation[31]. The connecting point of the 'carbon' focus of design issues to a certain degree promoted the cohesion and integrity of the design proposal.

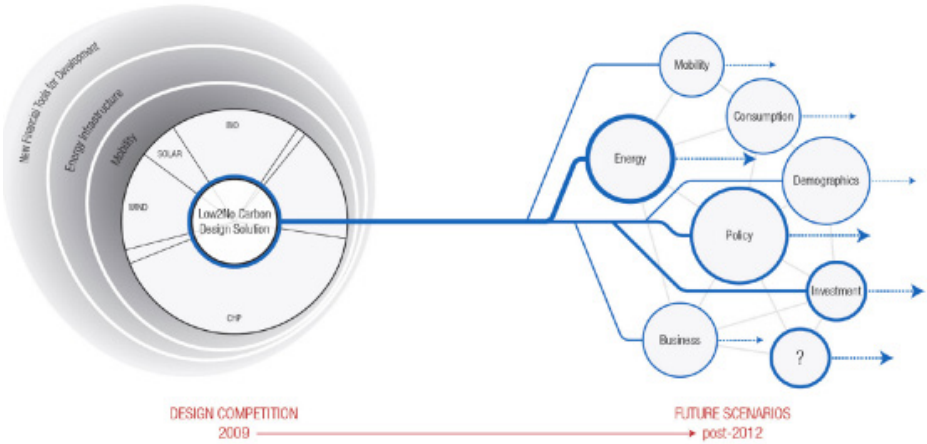


Figure 18. The Low2No competition design issues. Source: Low2No brief, 9.

Bechthold and Kane (2011) argued that the long history of societal consensus and common action constitute the basis of change on the interrelations of stakeholders. It shows that the shifts on competition rules, brief, request for qualifications and project site were made possible due to the strength of the organizer, SITRA, which is considered as a strong promoter for innovation and could report directly to the Finnish parliament.

The qualified competing teams from the RFQ were to propose indicators which measure the degree towards carbon neutrality, and also provide a new approach compared to the traditional Finnish competition. The qualified five teams were required to submit three tasks from July 8, 2009, to August 17, 2009, which included the following:

[30] The competition brief of Low2No design competition,p4
[31] 'There was an increased appreciation for the potential of something like this, the potential impacts, and recognition of how all of the elements of a competition with a wide scope would align with all of the activities and goals of SITRA. Once we made that connection (ED: to carbon) the competition took off as a much bigger thing.' – Bechthold & Kane (2011,8)

1. A framework for sustainable development that was replicable and could be adapted in other sites.

2. A system of indicators that could provide measurable evidence of how carbon neutrality was to be accomplished.

3. A design solution – referred to as the 'vision' in the brief – to serve as a tangible example for the implementation of the sustainability strategy, testing the degree to which it allows for soft accomplishments such as high spatial value, vibrant neighborhoods, and changing user behavior to be realized.

– Competition brief of the Low2No design competition, 8

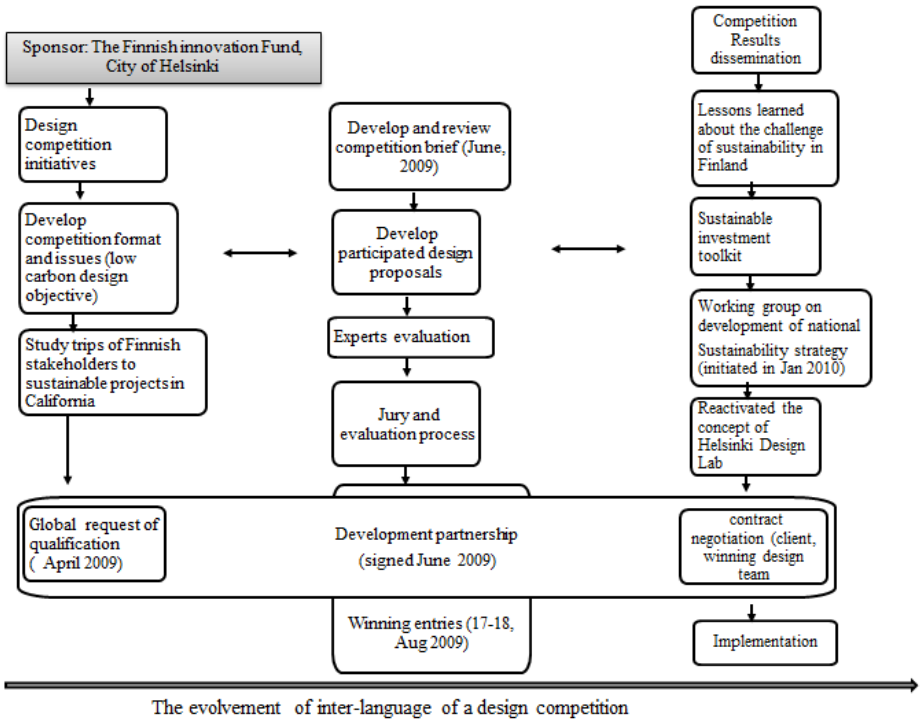


Diagram 6. The procedural flow of Low2No competition.

Eight evaluation criteria were also specified[32] to score the design proposal from the five finalists. However, critical voices on the conflicts between the ambition and the time limits of the Low2No competition were raised as well

[32] 'The efficacy, sensibility and rigour of the total low/no carbon solution; the efficacy and robustness of the broader, holistic model of sustainability; the robustness and simplicity (of the approach and use) of the sustainability indicator framework; the urban and architectural quality, and the near and long term implications of the design proposals conveyed through the visual representation of the vision; the ability of the framework/strategy for the proposed approach to be replicable within similar contexts; the feasibility of proposals including the overall economic efficiency and life cycle costs.'- Low 2No Competition brief, p18

(Bechthold & Kane, 2011). The design tasks and evaluation criteria have functioned as infrastructures for fostering expected outcomes of replicable knowledge on further sustainability development nationwide. At this stage, texts, diagrams, models and other types of technics of representing the design proposal came out as kind of boundary objects to promote the development of 'inter-language' at the professional level. The jury played a crucial role to guide the development based on the evaluation criteria.

The competition brief guided the subsequent evaluation of the five finalists, especially with elements concerned with sustainability in a systematic approach. For example, the developer from proposal C_life claimed that they were inspired by the criteria of the competition brief, which required to '*consider how their proposals generate wealth across stakeholders and find ways to define price in a way that does not externalize costs onto society*' (Bechthold & Kane, 2011, 17). Lisa Galley, who interacted with the design proposal of Arup & Partners reflected: '*This competition was an example of a process where the disciplines were all brought in on the front end rather than later on*' (Bechthold and Kane, 2011, 8). Various perspectives such as architecture, engineering, climate landscape, and development finance and mobility behavior were presented in the design proposal. The shift on competition rules, brief and request for qualifications were supposed to set up the preconditions for fostering innovative knowledge through the competition. In the competition brief, the original master plan was challenged with the competition design proposals. The Low Carbon – High Urban competition design proposal focused on 'urban scale' and radically proposed a new master plan. Indeed the 'urban scale' was emphasized in the requirement of the competition brief with the statement that the first phase of the master plan will be realized by 2012. However, the proposal was not directly disqualified by the jury, according to the new competition rules, as Marco Steinberg – the director of the strategic design of Low2No put it: '*We didn't want to exclude the opportunity that somehow the master plan could be impacted, but you can't erase the master plan. You have to take it as a given and figure out where the space for opportunity is. I hope we communicated to the teams that we were interested in an approach and not a solution*' (Bechthold and Kane, 2011, 18). But this opposition to the old master plan lowers the feasibility of the design proposal[33], since the infrastructure construction of the old master plan had already begun.

The proposal Rebuilding 2.0 proposed a high rise tower and broke also the zoning regulations of the old master plan. The idea of constructing a high rise tower was intended to increase the urban density. However, it was considered as deviating from the Finnish building culture by the Jury.

[33] "…But judging a proposal that challenged every aspect of the existing master plan was difficult for the Jury…Major changes for phase 1 of the master plan—which included SITRA site—were simply unrealistic… ' quoted from Bechthold & Kane (2011,18)

Figure 19. The five finalists. Source: Bechthold & Kane, 2011,14.

Regrets on insufficient communications occurred with the lack of presentations in person to the Jury[34]. In the end, the proposal C_life led by ARUP's London office won the design competition with the main focus on 'human behavior' and 'community development', taking a combined bottom-up and top-down approach. 'Energy strategy', 'carbon neutral policies', 'financial strategies such as green mortgages' were mentioned to respond with the competition brief and evaluation criteria of 'feasibility including economic efficiency and life cycle cost'. The 'ethnographic data', 'occupant behavior such as 50 ways to change human behavior' and 'information infrastructure such as link information campaigns, legislation, economic frameworks, and civic infrastructure to encourage both a grassroots, and government regulated, movement toward sustainability' were suggested in C_life. The project indicators were proposed, including 'overall measure, carbon emissions, energy, transport, and quality of life' with detailed measurements and rationale. The architectural design solution of C_life is rather 'generic suggesting its possible adaptation to various contexts'[35], doubted by some jurors with architectural and technical perspective; as ranked lowest in the technical report in the quantitative evaluation (Bechthold & Kane, 2011, 18). The proposal was based on the provisions of the old master plan. As Alejandro Gutierrez, the team leader from the Arup's London office admitted, they did not '*challenge the master plan in the traditional, formal way*' (Bechthold & Kane, 2011, 20).

> 'The team's proposal best met the Low2No competition assessment criteria. Furthermore the Jury found great promise in the outlined strategy that combined both a clear top-down as well as a bottom-up strategy for leveraging the Jätkäsaari opportunity in the spirit of the Low2No challenge. The jury felt that particularly the consumer/behavioral framework coupled with a monetary/economic model brought the best balance to this holistic strategy.' – p.16, Low2No Jury Final Report

At the procedural level, the shift of competition rules and RFQ already put up the change on the profound national competition tradition. Rounds of negotiations on prioritizing the Low2No competition also reconstructed the interrelation of the stakeholders and their perceptions. Key words such as 'systemic change', 'sustainable development', 'quorum', 'composition of Jury', 'adjudication of competition', 'multidisciplinary team expertise', 'systematic thinking' and 'interdisciplinary competency' were more frequently put forward to constitute the common shared language to promote the competition. At the knowledge level, the shift of the competition brief also practically guided the direction of generating knowledge. In particular, requirements of learning about differences and dependencies across a given boundary were specially emphasized in choosing international design teams.

[34] As Steinberg agrees: '*I think it would have been nice to have the teams engage in a discussion with the jury. Ultimately we were trying to weigh their intellectual capacity and experience.*'- quoted from Bechthold & Kane (2011,20)
[35] The design proposal of C_life.

It was realized by some experts that there were conflicts between the master plan and the ambitions of the competition[36]. The conflicts between the 'systemic innovation' and the existing conditions are obvious, and it is hard to define to which extent the design proposal should position itself by just following the wording of the competition brief. As reviewed from the competition process, the shift on competition rules, brief, RFQ and interrelations of stakeholders constitute effective boundary objects to foster the 'inter-language' as the final outcome of knowledge innovation. However, it is critical to increase the degree of interaction among stakeholders to avoid possible communication gaps due to the time limits of the competition. As one action from the pre-Jury evaluation phase, the study trip of Finnish stakeholders to example projects in California to raise the awareness on sustainable design definitely helped to construct the foundation for the 'inter-language'. However, the lack of in-person presentations during the competition evaluation definitely reduced the degree of effective communication. In a better communication environment, a more inclusive 'inter-language' could have been synthesized not only from the design excellence of the winner but also other finalists.

3.6 Conclusions

This chapter focuses on the recent set-up, application and development of international design competitions in Finland and China by scrutinizing illustrative cases. Due to the less-defined competition rules and the unique Chinese context, practical competition procedures differed from the Finnish model. Moreover, the competitive market gave the stakeholders different initiatives to hold design competitions. Other than generating inter-language on design knowledge at an international level, the publicity from advertising the urban development is of greater interest for the local government, the developer and the professionals. In other words, in most cases, the topic of the competition is not only focused on a design solution, but refers to wider social, political and economic interests along with the economic transition and rapid urbanization. It suggests that the governmental influence on the final proposal at the end stage of the competition cannot be ignored; potentially inducing major changes to the final master plan. I further argue that the transposition of the international design competition system in Guangzhou served as a 'designed trading zone' with an evolving inter-language, which actually fostered local settings to improve communication and cooperation on design knowledge. Design issues, competition procedures and regulations were changed along with the international design competition in the case. Based on the analytical concept of trading zone, it was shown that the evolution of an 'inter-language' on design forms, procedures and regulations of the 'designed trading zone' has been rendering the competition for producing design knowledge, although the im-

[36] 'There was a contradiction in how the competition was set up. It was clear that the competition was for a specific building on a specific site in the existing master plan. It was equally clear that the outcome they were looking for was systemic change at a large scale. Those two things were in conflict.'- Bechthold & Kane (2011, 20)

plementation of design knowledge could be closely related to the local settings and limited to an elite class. The young professionals are still not fully engaged in the process. And this is consistent with Sagalyn (2006). Note that this coincidental agreement may not stem from the original idea of considering competitions as tools to redistribute power intentionally (Sagalyn, 2006); instead, it is more likely to originate from the inherently complicated governmental role in the Chinese design competition business. In short, it is crucial to foster systematic local settings to leverage the knowledge input of international design competition systems.

On the other hand, the Low2No international design competition in Finland is not only a platform for producing design solutions, but also an infrastructure to generate knowledge in low-carbon urbanization development. Based on the analysis, I came to the key questions of how the organizer perceived and defined the design issues, how it organized the design competition, who participated in the design competition and how they were evaluated. In short, how to produce and develop an inclusive, appropriate and integrative enough 'inter-language' of the design competition? How to facilitate the flow of 'inter-language' associated with project conditions? The shift on competition rules, brief, RFQ and preconditions practically served as effective boundary objects to facilitate the production of an 'inter-language' as an outcome. Moreover, the strong commitment of the organizer and the consensus of stakeholders actively pushed the evolution of the inter-language'. The competition evaluation process further functioned to promote the evolution of 'inter-language' to the professional level. The competition implementation process supplied the chances to transform the 'inter-language' in connection with the local conditions.

However, there were still some gaps which hindered knowledge development. The rigid formats of contemporary design competition require an intensive degree of effective communications between the organizer, professional-advisor, competitor, client and user, which may largely affect the development of 'inter-language' of the design competition. As in the case study, the series of conferences, workshops and groups after the competition practically helped to promote the communication. In particular, the integration of Finnish experts in the process of design proposal development also affected the degree of local coordination and potentially led to the confusion of positioning themselves between innovations and pre-existing conditions.

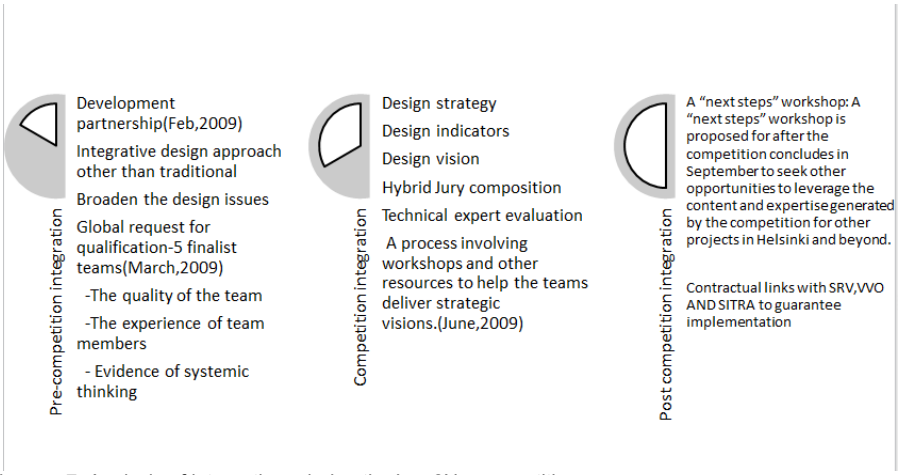


Diagram 7. Analysis of integrations during the Low2No competition process

As shown in diagram 6, there are various integrations as boundary objects reducing the communication gaps among the stakeholders. Up to this phase, it is important to concretize, transfer and integrate the 'inter-languages' in connection to local conditions. However, communications and negotiations between the developer and the winning team have proved to be problematic with concerns of the cultural gaps and heterogeneous working dynamics; they found that they were talking in different languages[37]. In the case, much was done in order to put the 'inter-language' connected to the local conditions. A series of conferences, workshops and working groups was organized, to construct common understanding on design approaches and working methods, by SITRA, which acted as a culture mediator. Through networks established by the Low2No competition, further steps as post integration steps were taken to speed up the communication of sustainability such as the 'sustainable investment toolkit' and 'Helsinki design lab'. Moreover, a working group on national sustainability strategy was initiated in January 2010 which included heterogeneous stages of interactions by stakeholders and the public. In particular, in one session of the 'Helsinki design lab', it also included some members of the other five finalists.

This practically helped the evolution of 'inter-language' that was generated by the competition (see diagram 6). In the case study, the focus on input of external knowledge to stimulate national systematic change should connect to the corresponding interactions to localize the knowledge. The flexible design competition brief with collective sustainable indicator systems potentially leaves the space for the localization of the external knowledge inputs. The organizer of the competition has a clear initiative of using the design competition to stimulate national sustainability innovations. The international design competition was considered, in my interpretation, as a 'designed trading zone' for knowledge elevating, coordinating, transforming and applying in connection

[37] Steinberg was concerned: 'This thing is slipping out of our hands. We are talking different languages here.'- Quoted from Bechthold & Kane (2011, 26)

with the local conditions. In particular, the strong consensus of the local stakeholders greatly facilitated the knowledge flow of the competition.

This chapter also probes to use the analytical concept of TZ and BO to analyse international design competitions. The design competition studies are often criticized for their 'complicit relationship', in which individuals may derive their perspective based on their own personal experience. This study allows the conceptualization of the flow of the international design competition process. The conceptual tools of TZ and BO have proved to be helpful in conceptualizing the vague nature of international design competitions. Furthermore, in the next chapters I underline that the challenges of international design competition do not only concern the allocation of the best design solution, but also how they are developed and connected with our built environment.

4 Competition Cases 3 and 4: The Shanghai World Expo 2010 in China and Europan 9 in Finland

4.1 Overview

In this chapter, I will analyze how various boundary objects interacted with each other and evolved to a 'design trading zone' in the two case studies of Shanghai World Expo 2010 in China and Europan 9 in Finland. Analysis of these two international design competition cases analyse concentrates on how the planning issues are defined, evaluated and connected to the urban development.

With focus on the sets of international design competitions of the Shanghai World Expo 2010 and Europan 9 in Finland, I analyzed how the boundary objects and trading zones were constituted, interacted and evolved during the competition process in the context of various design competition traditions.

The research method is thus based on the analytical concepts of BO and TZ, providing the framework to reconstruct and analyze the competition. The BO served as interface or entity between the different communities involved. As mentioned in Chapter 2.4.3.2, the boundary objects can be identified as Standardized forms and methods (competition procedures), Repositories (competition results synthesis), Ideal type (Competition evaluations: i.e., sketches, maps, drawings, diagrams, models, computer simulations,) and Coincident boundaries (Competition related project context maps).

4.2 Case study 3: The Shanghai World Expo 2010

4.2.1 The competition procedures

The planning process of Shanghai World Expo 2010 included three phases. The international urban planning and design idea competition was conducted

as a compulsory part of the application for hosting World Expo 2010. It was innovative in the sense of contributing innovation on the testing and consolidation of the design initiatives of the sponsor. The international urban planning and design competition was applied to host World Expo, deepen the design initiatives and results from the Phase 1. In the end, the international urban planning design project competition on Shanghai World Expo 2010 was conducted as a result of synthesis of participants and previous competition results.

Table 3. Different phases of the planning development of Shanghai World Expo 2010.
Source: Jin Yu, 2006, 40

Planning phases	Contents	Design competition theme	Participants
Phase 1 (2000)	International urban planning design idea competition on Shanghai World Expo 2010	To predict the impact of Shanghai World Expo 2010 project to the city	40 International students from different countries in 6 groups
Phase 2 (2002)	International urban planning design competition on applying to host World Expo	To analyse the spatial structure and functionality, sense of place making and innovation	Invited 7 world-renown international planning firms from countries which had hosted World Expo
Phase 3 (2004)	International urban planning design project competition on Shanghai World Expo 2010	To deepen the theme in detail, plan the activities, space arrangement, infrastructure system and landscape	Invited 10 world-renown design teams

4.2.2 The international ideas competition on urban planning and design on Shanghai World Expo 2010 – a dialogue based competition

Following the international model, the international idea competition on urban planning and design on Shanghai World Expo 2010 was held from October to November of 2000. Forty international students from different countries in six groups were invited by the Atelier of Cergy, European University of Cergy-Pontoise France and Tongji University of Shanghai. The Atelier of Cergy

was responsible for defining a topic for the working group in the competition; the theme of the idea competition was the impact of the event of World Expo 2010 on urban development of Shanghai, and the title of the competition was 'life quality of future metropolis' (Marc and Dai, 2001, 87). The project site was initially set by the government in Huanglouzhen (see Figure 22, 23), Pudong new zone of Shanghai. The government aimed to 'deepen the competition topic, and carefully consider the problems and dilemmas confronted by future city development, to solve the conflicts between the city and high life quality: to breake the traditional venues layout through innovative layout, transport and landscape planning' (Yang, 2003, 1). Interestingly, five proposals (Expo' lab, Rivernet, Interface, Canal Effect and Trait d'union) out of six (see Figure 20, 21, 22, 23, 24 and 25) have suggested adjustments in the project location (Yu, 2006).

'The Expo'lab (winning entry) proposed to choose a sub-exhibition hall as an 'urban experiment site' with environmental protection themes under the Lupu Bridge along the Huangpu River. A highly efficient traffic network would be set up to connect the main and sub-exhibition area. 'Exhibition' and 'experiment' are proposed to explain the future life style. 'Post-exhibition settlement' was also concerned in terms of using major exhibition halls as public facilities. The Athos Fair (runner-up) kept the initial project site but proposed that the unit of participation to the World Expo might be 'cities' instead of countries in terms of their importance in the world development. 'Interactive experiences' on various life styles for the visitors are recommended for the venue layout. The Rivernet (special creative award) proposed a whole new project site, based on the urban culture-geographical characteristics, the Shanghai World Expo 2010 was considered as 'catalyst which is special and hidden in the deep side of the city'. Four sub-exhibition halls along the Huangpu River would reshape the waterfront space, adequately exhibit the charm of Huangpu River and revive the urban life. The design team of the Rivernet proposal pointed out that the initial defined project site comprised a thriving pastoral landscape and deserved to be preserved. On the other hand, a large amount of industries along the Huangpu River separates the important waterfront area from the public. They proposed to reconstruct the 'dysfunctional -river front area' to rebalance the spatial structure of Shanghai. The Canal Effect also proposed new project sites along the Chuanyang River to revive the waterfront space to serve as an open public space.'- (Marc and Dai, 2001; Yu, 2006)

Figure 20. The original Shanghai World Expo project location. Source: Yang, 2003, 81

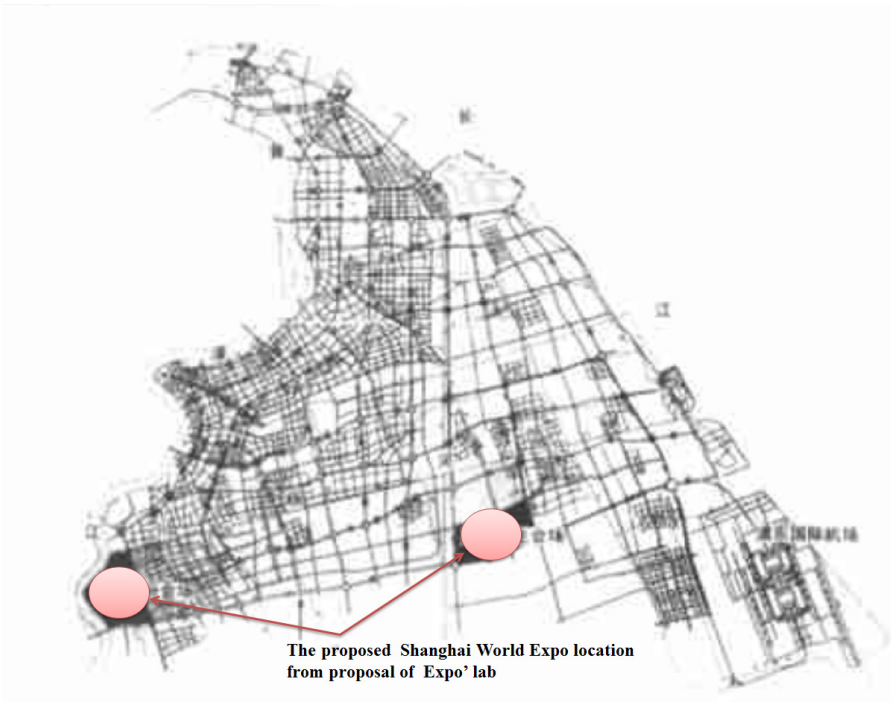


Figure 21. The proposed Shanghai World Expo project location from Proposal of Expo' lab. Source: Yang, 2003, 82

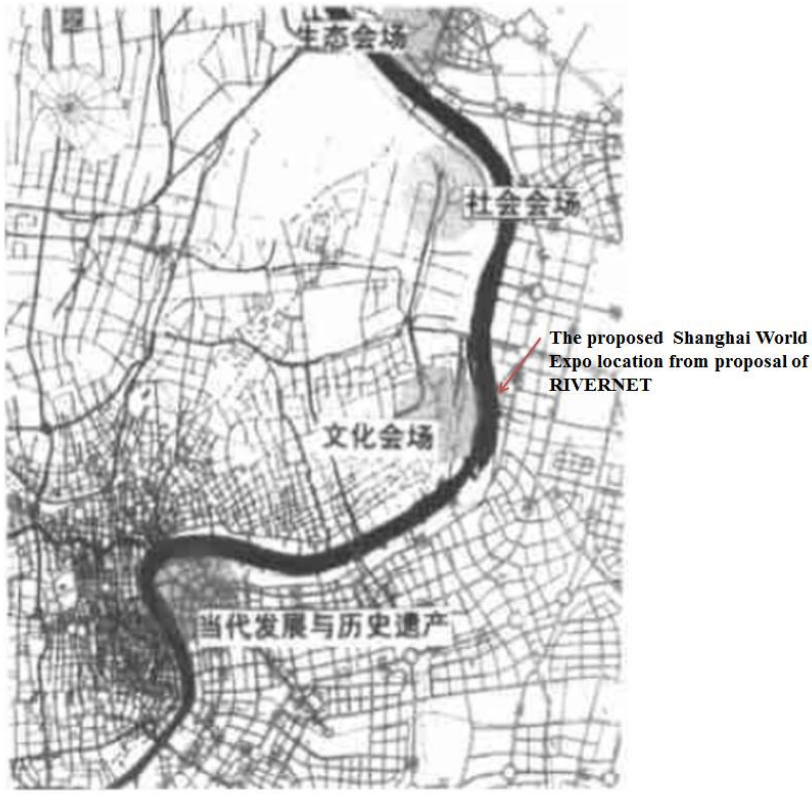


Figure 22.The proposed Shanghai World Expo project location from Proposal of Rivernet.
Source: Yang, 2003, 84

Figure 23.The proposed Shanghai World Expo project location from Proposal of Interface
Source: Yang, 2003, 84

Figure 24.The proposed Shanghai World Expo project location from Proposal of Canal Effect
Source: Yang, 2003, 85

Figure 25.The proposed Shanghai World Expo project location from Proposal of Trait d'union
Source: Yang, 2003, 86

4.2.3 International urban planning and design competition on applying to host World Expo

In order to specify the project planning and design proposal in 2001, on applying to host World Expo 2010, another international design competition was held with a focus on the spatial design and functionality development. Seven world-renown international planning firms from countries which had hosted World Expo before were invited to supply feasible design proposals.

> 'The proposal from the French company of ArchitectureStudio was considered as originated from the design concept of Rivernet and Canal Effect such as the elliptical canal, traffic network, waterfront venues; the concept of 'urban experiment' from Expo'lab is also developed to exhibit different urban history. The concepts of the 'large scale exhibition venues and green network will constitute an important part of the sustainable development of the city' are also accepted by the final planning and design. „- Yu, (2006, 2).

Figure 26. The layout of design proposal of architecture studio of France.
Source: official website of architecture studio of France[38]

[38] http://www.architecture-studio.fr/en/projects/shn3/world_exhibition_2010.html ,accessible on 08/02/2016

Figure 27.The layout of design proposal of architecture studio of France.
Source: official website of architecture studio of France

4.2.4 The international urban planning and design project competition on Shanghai World Expo 2010

In December 2002, Shanghai won its bid to host the World Expo 2010. In May 2004, the international urban planning design project competition on Shanghai World Expo 2010 started with a focus on nature and city, activities and exhibitions, exhibition and post exhibition, implementation and operations and representation of the Chinese culture. The professional company – an independent international bidding company was commissioned the power to organize the competition by the Bureau of Shanghai World Expo Coordination. It illustrated the willingness of collaboration of the government. Even though the competition condition and brief were not openly published, the procedures were explored, according to the interview of one judge of the international design competition[39], Mrs Xishuxiang. As the only professional judge in the jury panel in the pre-qualification phase, she highly praised the organization of the pre-qualification phase by the Bureau of Shanghai World Expo Coordination; at the pre-qualification phase, an interview of 40 minutes for each participant was held during 11th to 13th of May, 2004, based on the presentation of 24 participants with the selection criteria of: 'perceptions of Shanghai World Expo, innovations on the planning and design of Shanghai World Expo, professional credentials of design firms, operation schemes if selected'[40]. Ten participants were selected based on the final vote by the judges. The winner Rogers&ARUP and runner up Perkins provided valuable concepts in a concise form, such as 'constructing a 60 hectare riverfront oasis, green networking and

[40] Retrieved from the interview of one professional judge
http://www.100test.com/html/615/s_615189_61.htm, accessible at 22/02/2016

multi-center cluster arrangement' (Yu, 2006, 2). The concept of 'harmonious city' proposed by the Tongji University, United, was considered to respond well to the question of national culture representation, and it finally served as a root to the final master plan.

During the phase of competition results synthesis, innovative points of the winning entries and previous competition results were synthesized into the final master plan, which was implemented by the local professionals. In particular, an essay forum was set up for the officials who visited the Aichi Expo to spur fruitful discussion and final refinements on the master planning of World Expo 2010.

Table 4. The awarded three proposals of International urban planning design competition of World Expo Shanghai 2010

The awarded three design firms	Rogers&ARUP, USA **Winner (50,000 $ prize)**	Perkins, USA Second (30,000 $ prize)	Tongji University, United, Shanghai (10,000 $ Prize) Idea: harmonious city The original concept of the final planning

Figure 28.The final master plan of Shanghai World Expo 2010.
Source: the official site of Shanghai World Expo

4.3 Interpretations

4.3.1 The changed project site of Shanghai World Expo 2010 by competition – coincident boundary object

According to the specified research methods (see p33), the coincident boundary object of the competition case was not strictly defined and the boundary object of ideal type redefined the coincident boundary of the project. The boundary objects of standardized forms and methods of the competition were based on a dialogical approach, which promoted practical communication and cooperation. As Marc and Dai (2001) pointed out, the jury panel considered that the heterogeneous background and interaction of the participants helped to generate valuable design knowledge. The jury panel supplied a 'dialogue based' scenario and a development environment for all proposals (Marc and Dai, 2001, 88). The project site was changed from the mainland site (see Figure 20, 21, 22, 23, 24 and 25) to the riverfront in the effort to better integrate the spatial development of the city. And the theme of the Expo 2010 was confirmed as 'better city, better life'. It is revealed that the government's willingness to cooperate laid the basis for knowledge formation and evolution.

Figure 29.The change of the project site by the international conceptual urban design competition. Source: Jin Yu, 2006, 40

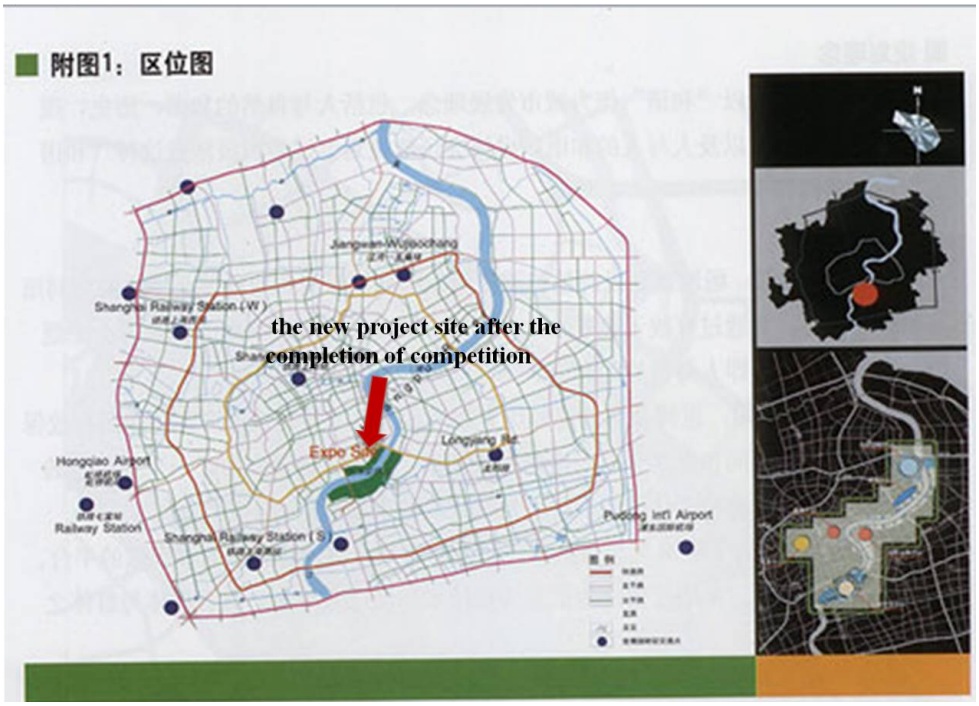


Figure 30.The project site of Shanghai EXPO 2010.
Source: the official site of Shanghai Expo 2010

4.3.2 The procedural design of Shanghai World Expo 2010 – new boundary object -triggered trading zone

A procedural design was set up to ensure the continuation of design knowledge into implementation. Gan and Wu (2010) argue that the difficulty of implementation of urban planning and design mainly follows from the fact that the design knowledge cannot fulfill the alteration of external environment along with the long process of implementation. According to Gan and Wu (2010), due to the uncertainty of the planning and design issue, the dialogue-based competition of phase 1 in the model (see Diagram 7) was described as a process of divergent thinking without limitations and as open to any interested group. After the winning tender of hosting World Expo 2010, the process of divergent planning thinking included the national discussion, an international seminar and symposium; it gradually converged into implementation and operation. There are important nodes on modification and synthesis of design knowledge associated with project conditions to converge the results of divergence towards implementation. Yu (2013) pointed out that the planning and design process of the Shanghai World Expo was a continuous process of 'context analysis-brainstorm-synthesis-implementation and operation'.

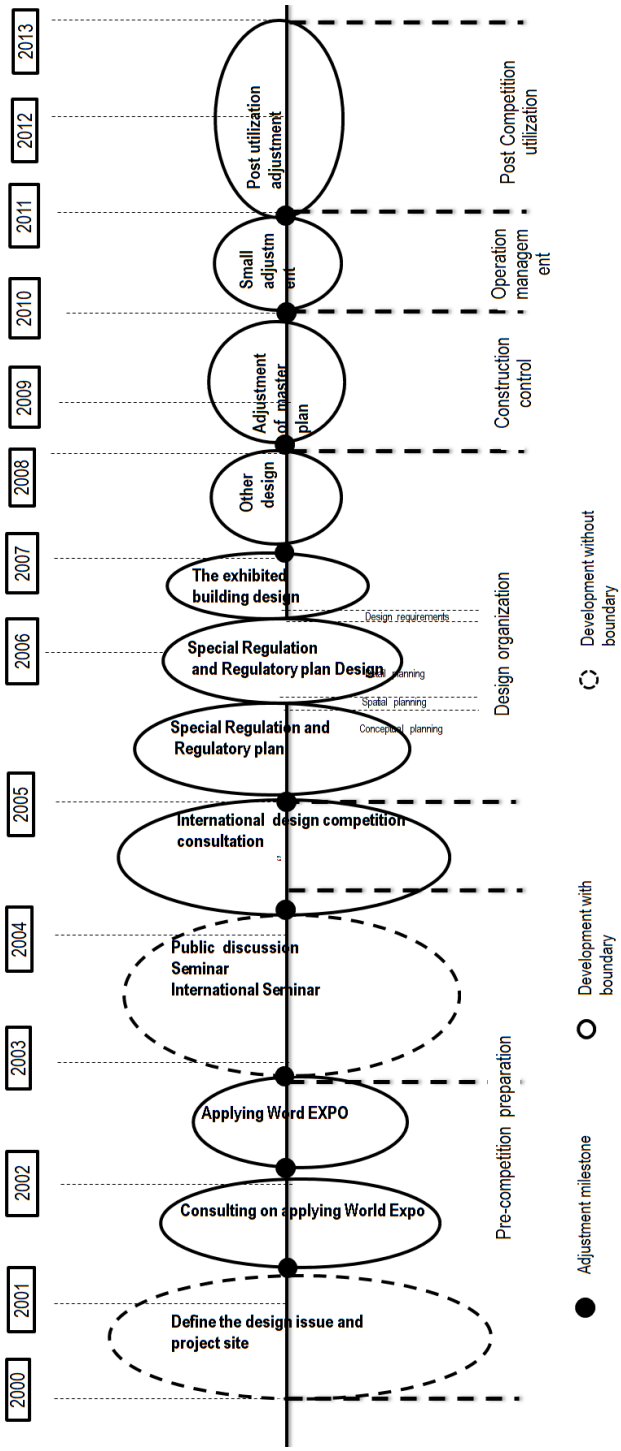


Diagram 8. The translated diagram: Shanghai world Expo 2010 planning and design pattern model. Source: Gan and Wu, 2010, 5

Note: Black dot indicating the synthesis and adjustment of accumulating design knowledge with clear milestone; the black cycle indicating that the development is with boundary(framework); and the dashed cycle indicating the openness of procedures(without specific framework).

From the procedural dynamics of diagram 7, it is interesting to see how the boundaries of planning and design thinking are set or opened. The openness of boundary supplied a better space for knowledge growing. The control of timing and the well-planned procedural design to a certain extent guaranteed knowledge coordination and continuation until the post-competition phase.

4.3.3 The new coordination unit for the implementation

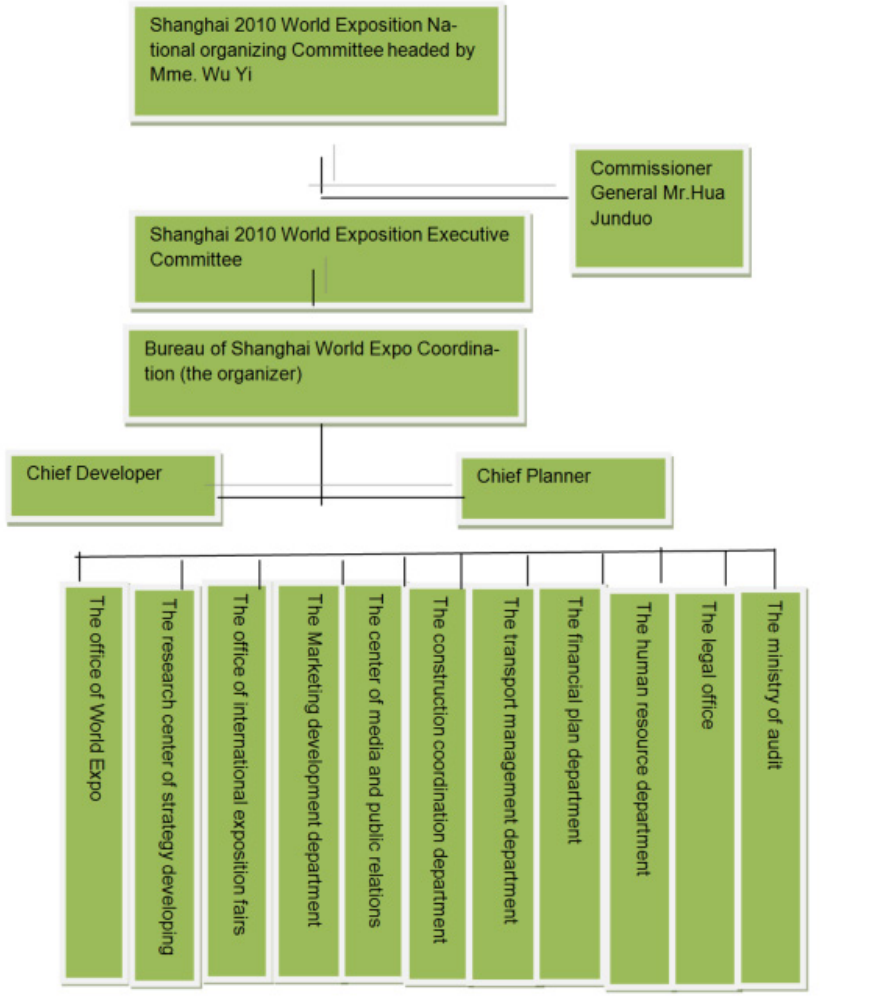


Diagram 9. The organizational structure picture of Shanghai 2010 Expo as translated by the author. Source: the report of the registration of Shanghai Expo 2010.

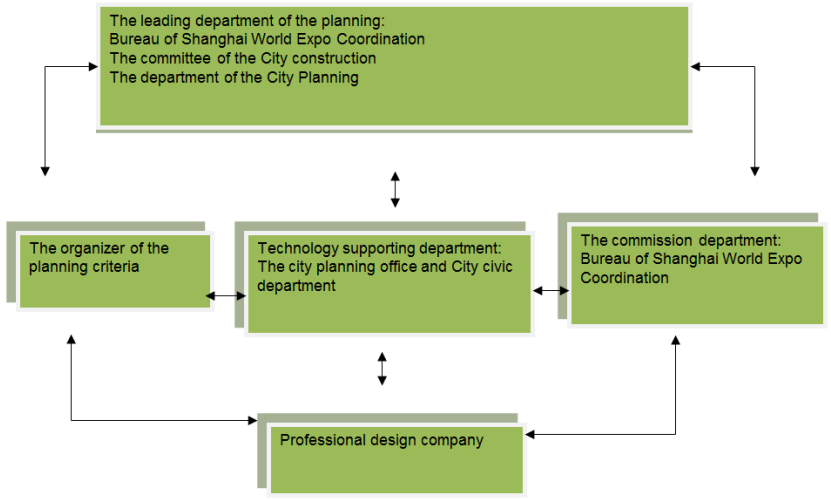


Diagram 10. The working structure of the planning team as translated by the author.
Source: the report of the registration of Shanghai Expo 2010.

The new organizational structure was set up for better operation and coordination, more actors were getting involved in the decision making process. The Bureau of Shanghai World Expo Coordination was constituted as a new unit especially to ensure the integration of different working units, the long term feedback, modification and improvement from the developing phase, construction phase to use phase, which consequently improved the efficiency of project implementation. The analysis indicated that boundary objects of the competition constituted a trading zone for producing innovative design knowledge. At the first phase of competition, the dialogue-based procedures and governmental cooperative initiatives greatly supported the forming of an inter-language among the different stakeholders, which helped to form design knowledge. In the second phase competition, the inter-language generated from the first phase was continuously developed and evolved into a concrete project proposal. From the third phase competition, the standardized forms and procedures ensured the feasibility of project implementation as the prequalification criteria showed. And the design knowledge generated of the set of competitions served to produce repositories for the development of the master plan. At this stage, the procedural design of World Shanghai Expo 2010 served as a linking boundary object with concise time milestones guaranteeing the connection with local conditions. In other words, it supplied a platform for the adjustment and synthesis of the design knowledge towards implementation.

Table 5. The relations of boundary objects of the competitions on Shanghai World Expo 2010.

Boundary objects	**Characteristics**	**Linkage boundary objects**	**Conditions**
Standardized forms and procedures	Closely related to the degree of certainty of the design initiative of the organizer: More dialogue-based in the phase of proposal consulting and more operation orientated in the phase of project competition	The procedural design put knowledge synthesis into connection with local conditions	The procedural design for the application of the introduced knowledge also supplies a chance and space for the knowledge transfer in connection to local conditions.
Ideal type	Interacted with standardized forms and procedures		The institutional reorganization supplies the operating unit for integration and application
Coincident boundaries	Interacted with the ideal type and reshaped the urban structure		
Repositories	Interacted with standardized forms and procedures, ideal type and coincident boundaries, served as basis of knowledge synthesis		The openness of the government and dialogue based competition support the flow of knowledge

4.4 Case study 4: Europan 9 in Finland

4.4.1 The case

The two specific projects (Espoo and Kotka) from Europan 9 in Finland were chosen firstly due to their specific relations to urban development. They are in the same theme of 'extension in question' of the design competition of Europan 9 in Finland, which aims to develop the city with a sustainability approach. The focus is on the question of how to efficiently deal with the development potentialities for extensions. The reason why I chose the two projects is also closely related to their specific relations with the Finnish design tradition.

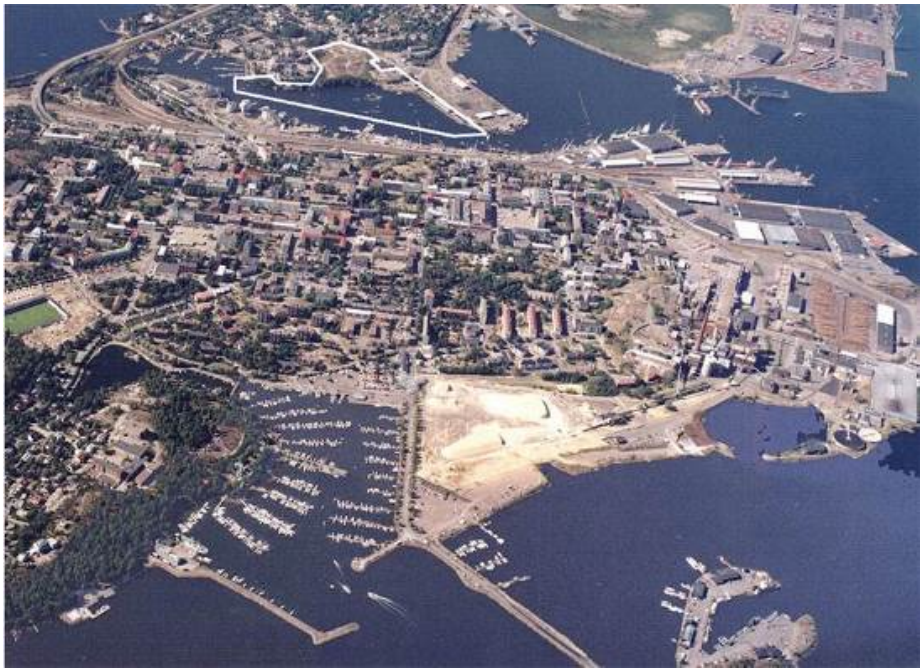


Figure 31,The Kotka site.
Source : the official site of Finnish Europan 9

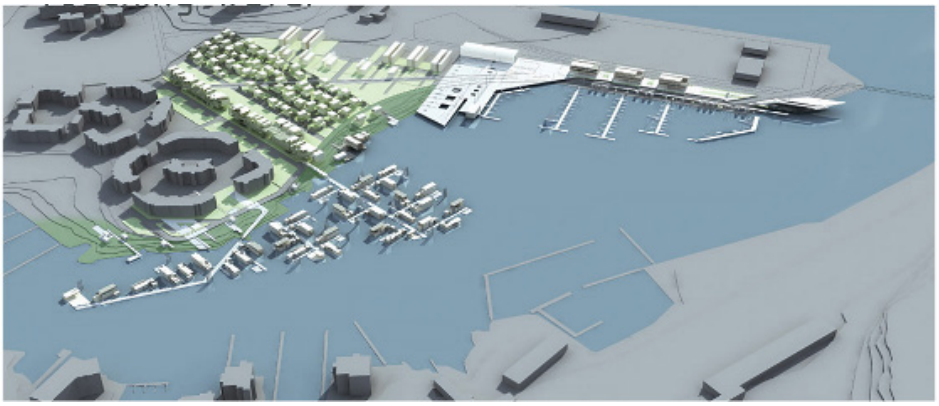


Figure 32. The winning proposal of the Kotka site.
Source: the official site of Finnish Europan 9

Figure 33.The site picture of Espoo site.
Source: the official site of Finnish Europan 9

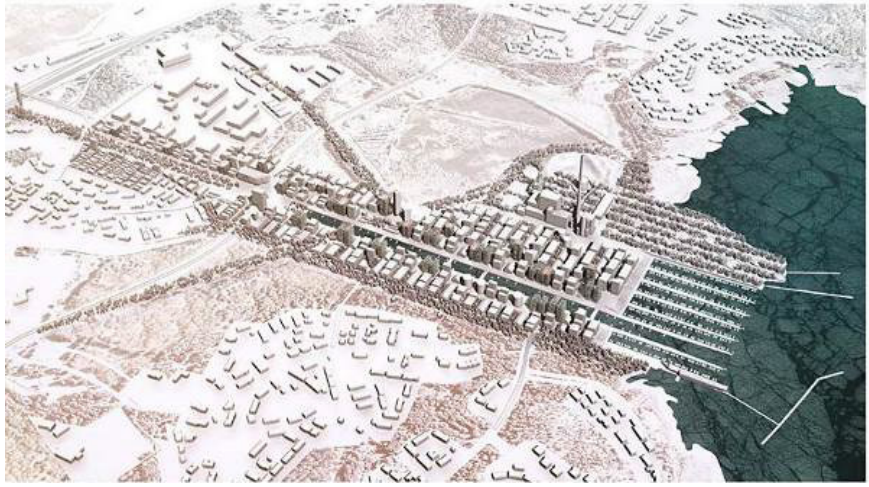


Figure 34.The winning proposal of Espoo site.
Source: the official site of Finnish Europan 9

4.4.2 Context studies: The institutional organization of Europan 9

Europan, the international idea design competition program, is remarkable due to its extensiveness and inclusiveness. It is a biennial idea competition program for young architects under 40, in order to promote design innovativeness from housing to urban areas across Europe. The design competition Europan 9 ran from February 2007 to January 2008 and involved 22 countries, 73 sites, 383 projects and 1,752 entries all over Europe. The institutional organization of Europan 9 is a European federation of national organisations, which manages the design competition. The competition was launched simultaneously in the participating countries with common themes, objectives and rules. The specific sites were submitted with regard to the various contexts of the respective countries. Although the implementation of the prize winning project is often in question, the exhibitions, reports and relative publications ensure the gain of publicity for the young architects. In addition to the agreement of the common topics, objectives and rules of the Europan 9, each country had its own jury panel consisting of nine members following clear common rules of composition. The members are supposed to be appointed by the national bodies and approved by the council of Europan European Association. The jury conducts the final judgment following the common competition rules. Among the rules is the statement that the jury is not to consider additional documents or models in any circumstances.

4.4.3 The application of Europan 9 in Finland

The general competition rules of the Nordic countries differ in how forms, concerns and focus are stated in the rules, respectively. For instance, the Swedish competition rules are structured by different components of design competitions such as promoter, types and forms of competition, while the Danish competition rules take off from ways of organizing design competitions such as conditions governing competitions and assessment conditions of entries. But they share the common modes and vocabularies of the rules such as promoter, types and forms, eligibility of entrants, jury organizations and compositions, competition brief, anonymity, costs, assessment, competition documents and publicity. On the other hand, the Finnish competition rules emphasize the relatively more important role of the Finnish Association of Architects (SAFA) in relation to different items of the general rules, compared to Denmark and Sweden. Reza Kazemian and Magnus Rönn (2009) have stated that the Finnish experience contains innovative solutions in the realm of urban revitalization, poverty elimination, environmental pollution, cultural and socio-spatial renewal, and democratization of the design and planning process.

The European Europan association plays an important role of unifying different national structures. Its general assembly consists of four representatives. Its scientific committee has responsibility to 'formulate common themes, conduct a comparative analysis of sites and results and contribute to strategic ideas on urban development in Europe's towns and cities' (official website of Europan 9[41]). The central secretariat of the association will coordinate the activities of the national secretariats, the council and the general assembly. Furthermore, the European general secretariat is responsible of ensuring the compliance to the common rules and holding European events and competitions. The international organization for the competition Europan 9 in Finland is depicted in Figure 32. As required in the common competition rules, the jury and technical committee were to be appointed by the national bodies and its task was to make the final decision of the winners.

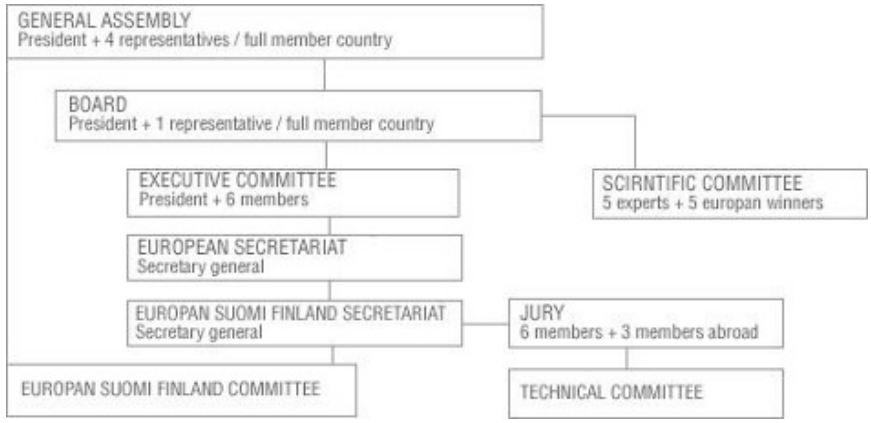


Figure 35. The international organisation of Finnish Europan 9. Source: from the official website of http://www.europan.fi/

With such a profound competition tradition in Finland, it is of great value to explore how the general topics and rules have been adopted in the case of Espoo and Kotka.

4.5 Analysis of boundary object of ideal type

The jury and the competitors perceived the posed design issue and concepts differently. On the basis of the original explanation of ICF definition by Oxman (1994), I adapt the design issue, concept and form as following:

- Design issue and concept: in a design competition, the design issue and concept are often mixed together and related to design problems which are deliberated by the organiser, professional advisor and jury in terms of programmatic statement in the documents of competition brief, competition conditions and jury report in some cases.

[41] Sited from http://www.europan-europe.eu/en/sessions-info/europan-9

- Design form: The design form denotes the specific design expressions that materialize the solution principle in the form of drawing, model or other professional expressions.

Sudjic (2005) argues that the defined criteria supplied by experts contains architectural excellence; the ICF model makes it possible to explicitly identify, categorize and compare various degrees of weighting evaluation criteria during the design competition evaluation process. However, a design competition involves not only recorded processes in textual material but also other forms of presentation such as images and videos. The local conditions and interrelations of local stakeholders are equally important in terms of knowledge coordination of the design competition. That is why the conception tools of trading zone and boundary object will be utilized along with the ICF analysis.

An ICF analysis is performed on two columns: the degree of relevance of design form towards specified design issues ranked by what the competitor proposed; the degree of relevance of design form towards specified design issues ranked by what the jury judged. The comparative analysis aims to reveal how the evaluation is applied and what are the various weights of evaluation criteria. Diagram 12 and 13 show how, under different reference systems of design quality and value, considerable differences can occur during the competition selection process. It is manifested that certain design forms such as ②or ③ in the case of Espoo (related to accessibility) and ③ or ④ (related to built forms and accessibility) receive relatively more weight than other forms, which explicitly represent themselves as important design knowledge extracted from the case study.

In this case, some evaluation criteria are represented in a subjective way. Emotional words appeared in the jury report such as ‘fascinating’ and ‘nice’. In the case of Kotka, it is manifested that the ways representing the design proposals potentially affect the selection process, according to the jury report.

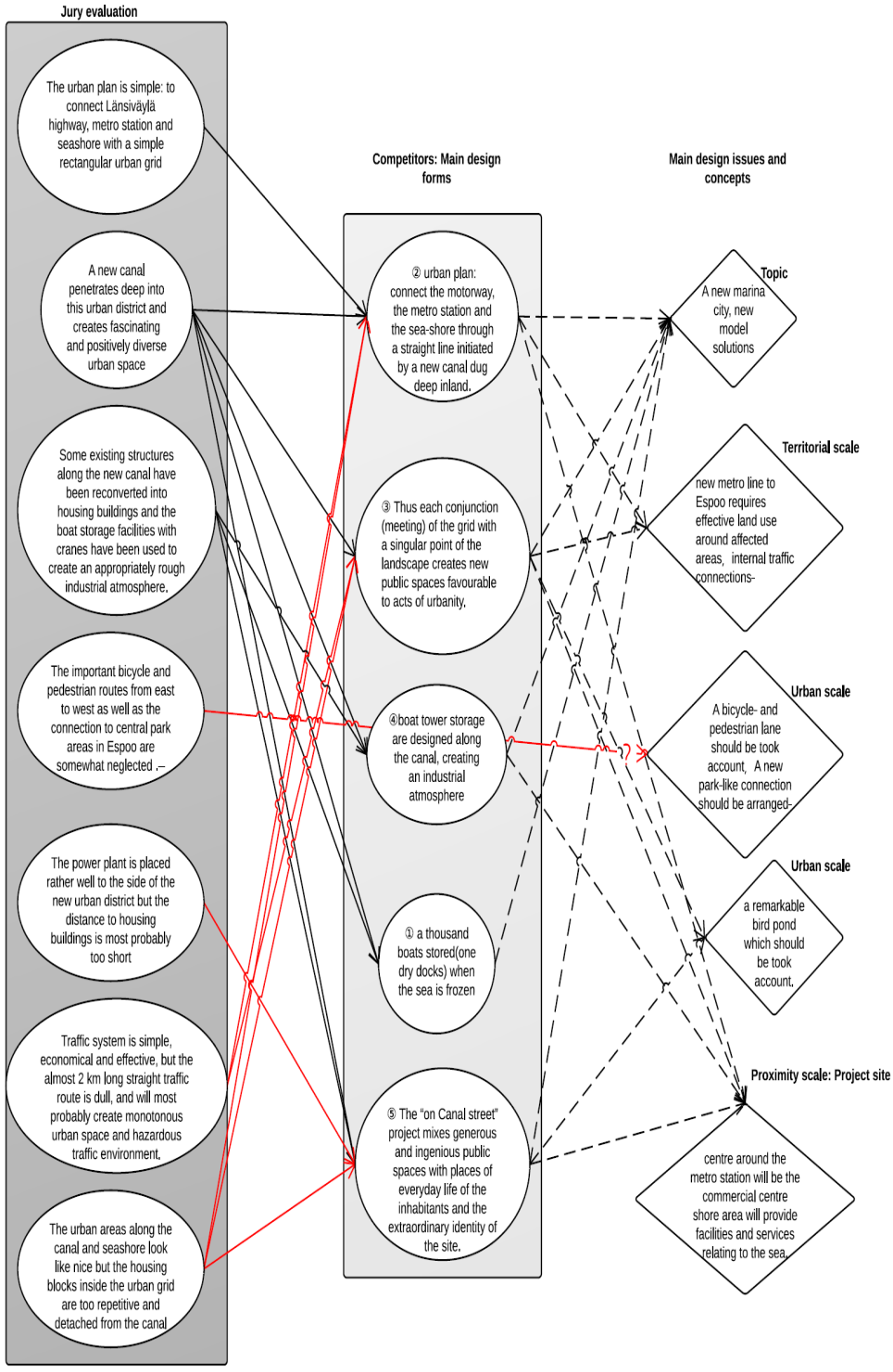


Diagram 11. The ICF analysis of the Espoo case based on Jury report, competition brief and submitted design proposals from the participants (text data from jury report).

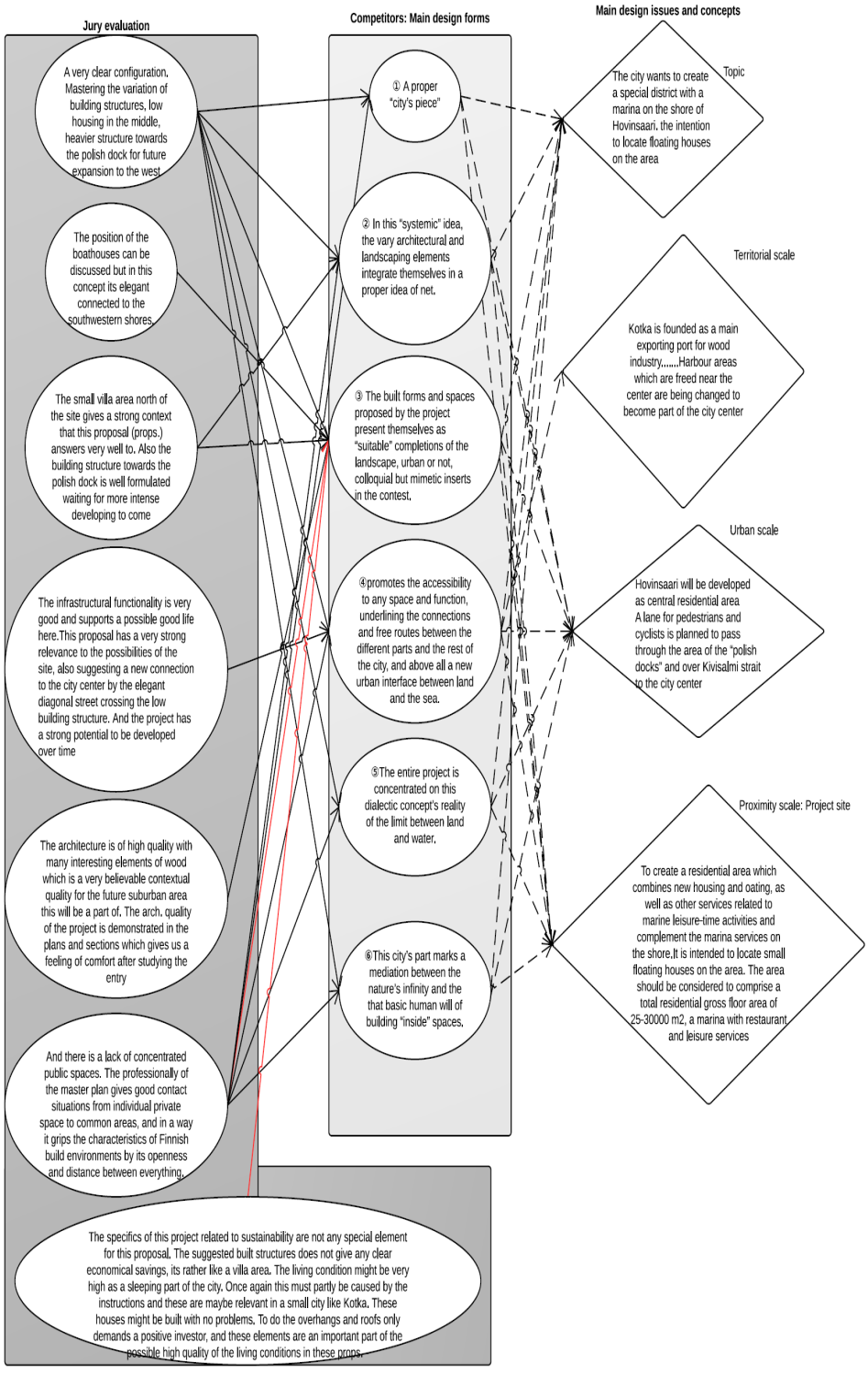
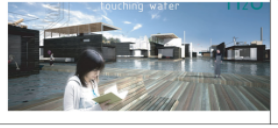


Diagram 12. The ICF analysis of the Kotka case based on Jury report, competition brief and submitted design proposals from the participants (text data from jury report).

Design issue and concept	Espoo, Finland (Population 232 000, Site area 50 ha, Study area 100 ha)		Evaluation by jury
	Design form proposed by participators On Canal street E7910 (Prize)		
Topic: The marina city Finnoonlahti. The competition area is located in Suomenoja in the city of Espoo. It lies at distance of under 15 kilometres from the center of Helsinki. A heating power station, a water purification plant and the cities largest marina is located on the area. The rest of the area is unbuilt. The water purification plant will move from the area by the year 2010. The City of Espoo wants proposals for a **new marina city**, where water-related leisure-time activities and habitation are closely intermingled. The competition area is considered suitable for a marina city because of its sheltered location, its connections to the surrounding urban areas and its competitive position in the Helsinki region. How much habitation could be located on the competition area of Finnoonlahti. How will the new suburb be proportioned to the surrounding housing areas and marina activities the power plant, and how could the idea of a marina-city be realized?-----① , ②, ③, ④ , ⑤	+	① The Marina of Finnoonlahti, at present time a deserted platform on the seashore, welcomes in the winter time more than a thousand boats stored(one dry docks) when the sea is frozen.	++	The urban plan is simple: to connect Länsiväylä highway, metro station and seashore with a simple rectangular urban grid.--②
Territorial scale: conurbation The city of Espoo has formed a new master plan for the coastal region with a reservation for a metro line to be built to Espoo. The building of the new metro line to Espoo requires effective land use around affected areas. Espoo, like other cities around Helsinki, is divided into several regional centres with the best connections to central Helsinki. With the growth of Espoo the demands of internal traffic connections have grown. ----②,③	+++ ++	② The urban plan of the new neighborhood is simple: connect the motorway, the metro station and the sea-shore through a straight line initiated by a new canal dug deep inland.	+++ - -	A new canal penetrates deep into this urban district and creates fascinating and positively diverse urban space.-----①, ②, ③, ④, ⑤
Urban scale: study site The nearest built areas to the east and west are dominated by housing with 1-2 floors. Near the Länsiväylä highway to the north from the competition area there is a reservation for a metro station.	++ ++	③ The urban grid of the project links with sensitivity to context of the surrounded edges. Thus each conjunction (meeting) of the grid with a singular point of the landscape creates new public spaces favourable to acts of urbanity: the Frozen Plaza on the waterfront, the wooden deck on the bird pound…		
Programmatic intentions: A bicycle- and pedestrian lane runs alongside the shore line. Its importance for recreation and communication is great. A new bicycle- and pedestrian bridge connects the Suomenoja side to the Laajalahti side. A new bicycle- and pedestrian bridge should be arranged from the area. On the North side of the power plant there is a remarkable bird pond which should be taked account. ----- ③, ⑤	++ -	④ To meet the requirements of anticipation, boat lovers storage are designed along the canal, equipped with maintenance supply available to the place while generating a unique urban experience.	++	The important bicycle and pedestrian routes from east to west as well as the connection to central park areas in Espoo are somewhat neglected. ----- ?
Proximity scale: site of project Finnoonlahti descends from the north to Suomenoja bay, which has been closed by a dam to form a waste water pond for the water purification plant. The pond has become a significant place for bird life. The shore area has been expanded through filling the Suomenoja bay as the harbour has grown during the last thirty years. **Programmatic intentions:** The centre around the metro station will be the commercial centre of the study area, whereas the shore area will provide facilities and services relating to the sea. The centre around the metro station together with the shore area and harbour will create an urban marina city. ---③, ⑤,④,②	+++	⑤ The "on Canal street" project mixes generous and ingenious public spaces with places of everyday life of the inhabitants and the extraordinary identity of the site.	++ - -	The power plant is placed rather well to the side of the new urban district but the distance to housing buildings is most probably too short. ----- ⑤ Traffic system is extremely simple. It is based on one main street with pleasant boulevard character. It is long, straight and effective, but the almost 2 km long straight traffic route is dull, hazardous traffic environment. ----- ②, ③ The urban areas along the canal and seashore look like nice but the housing blocks inside the urban grid are too repetitive and detached from the canal -⑤, ③ ②
General Jury remarks: Despite its shortcomings this proposal possesses a rare quality: it successfully creates an **original and imaginative** urban district with **strong character and unique world of experience**. Along with some other proposals using **a systematic and rationalized urban grid** as the starting point for the design, this entry is only partially successful in taking into account the existing environment. This project is exceptionally **skillfully presented with expressive and lyrical urban sceneries**. Some of the perspective images are **breathtakingly beautiful**. General Jury remarks on all design proposals: The aim of the competition was to study the interlocking and functional potential of the marina and housing located on the shore. Another objective was to find ideas how to connect the shore area to the construction of the area around the metro station towards the north. Although several entries propose further filling the area, the suggested fillings are not very extensive. Canals and water features pushing to the north come up in many of the entries. Entries were diverse, presenting potential for everything from small-scale, close-to-nature solutions to massive, sculptural compositions. The best entries managed to incorporate the marina functions and boat storage as a natural part of the urban structure while creating a unique and interesting urban environment. Activities along the shore, such as restaurants and commercial services for boating, have ideally been made into an inviting urban space, a square or a boulevard. The competition entries show that it is possible to convert the area for housing use, and that there are many good solutions for building the area efficiently.				

Diagram 13. The ICF analysis of the winning project of Espoo of Europan 9 in Finland. Source: the official jury report of Europan 9 in Finland, Europan 9 result book.

Kotka, Finland(Population 55 000, Site area 11 ha + sea area)

Design issue and concept		Design form proposed by participators Touching water ,LK707 (Prize)		Evaluation by Jury
Topic: Kotka –a marina quarter in the center The city of Kotka is developing its passenger harbour and the south shore of Hovinsaari island as part of the city's central area. As the harbour activities of the so called "Polish docks" are moved away within next twenty years, a large area is freed on the south shore of Hovinsaari. The area is possible to connect to the central area next to the site of the new Marine museum with a pedestrian bridge. At present the area is mostly unbuilt land. The city wants to create a special district with a marina on the shore of Hovinsaari. What kind of public spaces can be created by shore building together with a marina? There is also the intention to locate floating houses on the area. How can floating housing be combined with harbor functions and shore building? How the needed marina services should be organized together with housing?--①,②, ③, ④ , ⑤, ⑥	+ + +	① The big emptiness in the competition's area gives the opportunity of designing a proper "city's piece" on which we can express and realize a contemporary idea of living. Some issues are always present and definitely relevant in the recent contemporary debates on urban design: the role that urban planning has in urban strategies, the connection's meaning between scales and constant relevant themes and how it responds to the necessity of fast changes conciliating local expectations and international motives.	++	A very clear configuration. Mastering the variation of building structures, low housing in the middle, heavier structure towards the polish dock for future expansion to the west. -①,②, ③, ④, ⑤, ⑥
Territorial scale: Conurbation: Kotka is founded as a main exporting port for wood industry. It has two centres: Kotkansaari island which is mostly conceived as the city centre and Karhula. The city center was created on islands which are connected by the main road and the railway. The center is surrounded by several harbours. The functions of the harbours are being concentrated and expanded with the growing demands and competition. Harbour areas which are freed near the center are being changed to become part of the city center---④	+ + +	② The project proposes a way of designing the city not as a succeding or overlapping of single objects or architectural episodes, but instauring complex spatial and architectural relations according to a "systemic" proportion of the city. In this "systemic" idea, the vary architectural and landscaping elements integrate themselves in a proper idea of net, as alternative of a hierarchical and centripetal city or only made of architectural emergencies.	++ +	The position of the boathouses can be discussed but in this concept its elegant connected to the southwestern shores. -----③
Urban scale: study site The center is separated from Hovinsaari to the north by the narrow strait of Kivisalmi. The north side of Hovinsaari is in industrial use, the east shore is harbour area and the south parts are residential area. A park area follows Kivisalmi shoreline which is used by small boat owners.	+ + +	③The built forms and spaces proposed by the project present themselves as "suitable" completions of the landscape, urban or not, colloquial but mimetic inserts in the contest. 	++ ++ -	The small villa area north of the site gives a strong context that this proposal (props.) answers very well to. Also the building structure towards the polish dock is well formulated waiting for more intense developing to come. ------②, ③
Programmatic intentions: Hovinsaari will be developed as central residential area in the future. A lane for pedestrians and cyclists is planned to pass through the area of the "polish docks" and over Kivisalmi strait to the city center.-----① , ②, ③, ④ , ⑤, ⑥	+ + + +	④ The project promotes the accessibility to any space and function, underlining the connections and free routes between the different parts and the rest of the city, and above all a new urban interface between land and the sea.	++ +	The infrastructural functionality is very good and supports a possible good life here. This proposal has a very strong relevance to the possibilities of the site, also suggesting a new connection to the city center by the elegant diagonal street crossing the low building structure. And the project has a strong potential to be developed over time. ----------④
Proximity scale: site of project The competition area is limited in the west by a residential block area (the blocks are separated by a park zone), in the north by a harbour functions area and in the south-east by Kivisalmi. **Programmatic intentions:** The aim of the competition is to create a residential area which combines new housing and oating, as well as other services related to marine leisure-time activities. The residential area should also complement the marina services on the shore. It is intended to locate small floating houses on the area. The area should be considered to comprise a total residential gross floor area of 25-30000 m2, a marina with restaurant and leisure services. --------① , ②, ③, ④ , ⑤, ⑥	+ + +	⑤The entire project is concentrated on this dialectic concept's reality of the limit between land and water: the cost line is contemporarily the start and the end point of the city's territory. It is the place where the limit of the vastness of the nature and the sense of the anthropology's made up order imposes itself. 	++	The architecture is of high quality with many interesting elements of wood which is a very believable **contextual quality** for the future suburban area this will be a part of. The arch. quality of the project is demonstrated in the plans and sections which gives us a feeling of comfort after studying the entry. ----③ And there is a lack of concentrated public spaces. The professionally of the master plan gives good contact situations from individual private space to common areas, and in a way it grips the characteristics of Finnish build environments by its openness and distance between everything.--③, ①,②, ④ , ⑤, ⑥ The specifics of this project related to **sustainability** are not any special element for this proposal. The suggested built structures does not give any clear **economical savings**, its rather like a villa area. The living condition might be very high as a sleeping part of the city. Once again this must partly be caused by the instructions and these are maybe relevant in a small city like Kotka. These houses might be built with no problems. To do the overhangs and roofs only demands a positive investor, and these elements are an important part of the possible high quality of the living conditions in these props.--③
	+ + +	⑥ This city's part marks a mediation between the nature's infinity and the that basic human will of building "inside" spaces. 	++	

General Jury remarks:

- ✧ This proposal has, like most of the other suggestion, **a character of suburbia and little of urbanity**. This must mainly be related to the criteria put up by the municipality.
- ✧ **Very well related to the aims formulated by Kotka municipality**. Less debating urban spaces and the result gives quite open housing areas.
- ✧ The living condition might be very high as a sleeping part of the city. Once again this must partly be caused by the instructions and these are maybe relevant in a small city like Kotka.
- ✧ The presentation may **appear having too flashy and conventional 3D's**. This proposal is though **not so innovative rather very well done.**

General Jury critique on all design proposals:

- ✧ Jury work has to do with maturing and give the projects time to evolve in front of us. All the time we need to study the projects and do it once more. Architecture is a process, to develop and to understand.

Diagram 14. The ICF analysis of winning project of Kotka of Europan 9 in Finland.
Source: the official jury report of Europan 9 in Finland, Europan 9 result book.

Note: ①-⑦indicate the design form proposed by the participated designers

General evaluation criteria of Europan 9 : during its first session, the jury assesses projects on the basis of:

- their conceptual content,
- the degree of innovation with which they address the overarching Europan theme, European urbanity.

During its second session, the jury assesses projects on the basis of:

- the relationship between concept and site;
- their relevance to the questions raised by the topic;
- the relevance of their programme to the general brief for the site they relate to;
- their potential for integration into a complex urban process;
- their architectural qualities;
- the innovative nature of the proposed public spaces;
- the consideration given to the connection between housing and other functions;
- their socio-economic viability;
- their technical qualities;
- Competition rules of Europan 9

Procedural analysis

In the cases of Espoo and Kotka of Europan 9 in Finland, from the pre-jury evaluation, at the European level, a research committee was put up to thematically and comparatively analyse the designated sites and the projects selected by the national jury on the basis of common objectives and contribution to strategic ideas on sustainable urban development in Europe's towns and cities. This leads to vagueness for the jury evaluation with respect to the selected project site (see Diagram 14). At the national level, the authorities and developers proposed the corresponding site. According to the jury report of Espoo and Kotka, the respective juries pointed out that the definition of the generic theme and objectives were not stated clearly enough, which led to a certain degree of confusion and difficulties during the evaluation process. Some general guidelines for the competitor were suggested by the Finnish juries to avoid the same simple mistakes on the less experienced entries. However, they also mentioned that this free form of the general program and theme of competition also rendered the Europan 9 quite a unique competition.

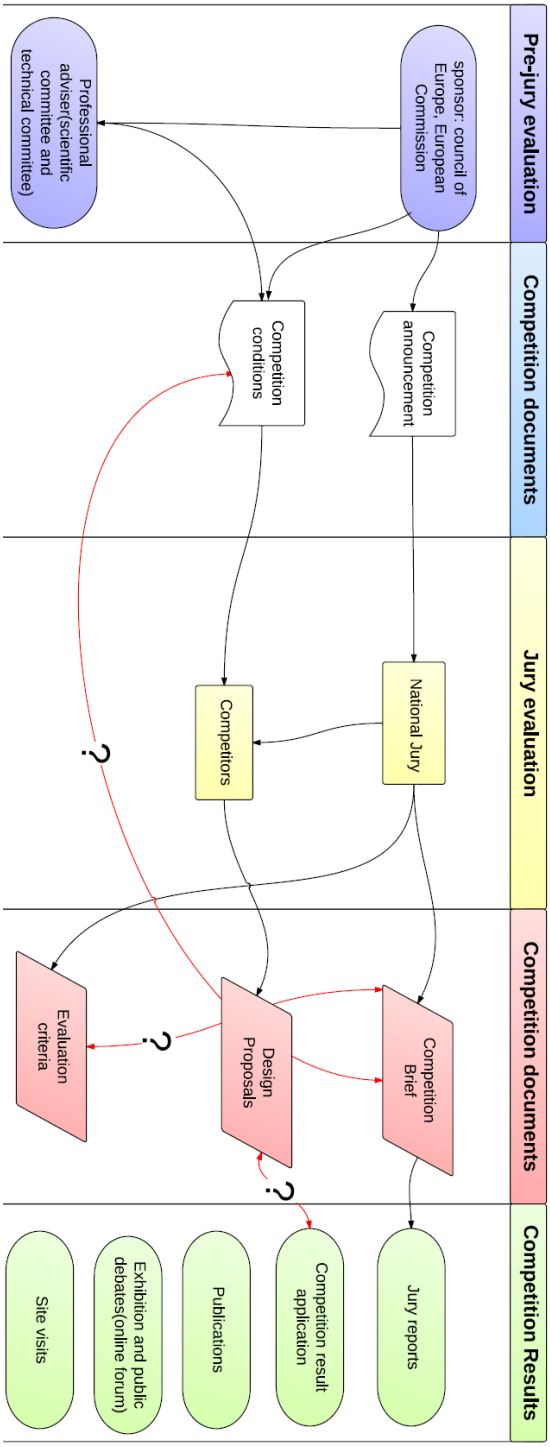


Diagram 15. The procedural analysis diagram

Through the procedural analysis as showed in diagram 14, the rigidity of contemporary competition format is revealed. The professional advisor assists in the selection of the jury board, setting up of the procedural rules (competition conditions) and definition of design issues, which are to be obeyed during the competition process. The Jury will evaluate the competitors and select winners and distinguish the qualities according to the evaluation criteria specified in the project program document: the competition brief with consensus among them. The roles of sponsor, professional advisor and other possible parties are intertwined during the competition specification phase and put a major impact on the decision of evaluation criteria on choosing the winning entry. However, it is possible that the competition design issues are not appropriate in relation to the development of the competition process. Moreover, the evaluation criteria of selecting the winning entry may be not accurate in connection to the competition conditions and brief. Even the Jury could possibly judge the competition proposals with hidden personal preferences instead of following the evaluation criteria. In particular, competitors may also take the seemingly known or imagined preferences of the jurors into account during the design process. In the case studies, the jury report is based on the judgemental paragraph on each entry and did not point out the relations with the generic evaluation criteria as specified in the competition condition. As I mentioned, the national jury questioned the applicability of general evaluation criteria specified in the Europan 9 competition condition, which could lead to a degree of confusion. Moreover in the case of Kotka site, the jury clearly mentioned that the municipality of Kotka should learn more from the project and better define their design issue as we can find in the section of assessment remarks.

The in-depth analysis indicated that boundary objects of the Europan 9 competition constituted a trading zone for elevating innovative design knowledge by local coordination. At the first phase of competition, the specified competition procedures of the Europan 9 program and the profound competition tradition of Finland interacted in terms of forming an inter-language among the different stakeholders. The conflicts and agreements revealed the strong role of the competition tradition. And the inter-language generated was well-documented and served as repositories for the possible uses. The ICF analysis on the boundary objects of ideal type also illustrated the strong role of Jury in the evaluation process.

The linkage boundary objects with the accessible documentation system and the competition tradition to a large scale helped the knowledge transformation in connection with local conditions. They served as a platform for the possible use of design knowledge towards implementation and further use in the built environment.

Table 6. Boundary objects and trading zone analysis of Europan 9

Boundary objects	Characteristics	Linkage boundary objects	Conditions
Standardized forms and procedures	Closely related to the degree of certainty of the design initiative of the organizer: Europan 9 competition rules and competition tradition of Finland	The strong Europan 9 institutional arrangement supplies the competition rules and conditions steering the competition The profound competition tradition of the jury supplies professional suggestions to elevate and transform competition knowledge into built environment	The well-documented competition process supplies the chance of knowledge flow
Ideal type	Interacted with standardized forms and procedures and to a certain degree connected to the professional preference of the jury (see ICF analysis)		The strong role of professional organization has played the role of promoting the development of design knowledge
Coincident boundaries	Specified by the Europan 9 Finland		
Repositories	Interacted with standardized forms and procedures, ideal type and coincident boundaries, served as basis of knowledge synthesis, the accessible documentation system supplies the chance of knowledge flow		The well-established competition system /tradition fosters strong consensus of stakeholders for further development.

4.6 Discussion and Findings

In the case studies of Espoo and Kotka of Europan 9 in Finland, from the quantitative analysis of design issues, concept and forms elicited from the texts, similar expressions were found to evaluate the design proposal, such as 'fascinating and positively diverse urban space', 'appropriately rough industrial atmosphere', 'expressive and lyrical urban sceneries' and 'original and imaginative urban district with strong character and unique world of experience' which are not explicitly related to the design issue and specified evaluation criteria in the design competition conditions of the Europan 9 competition. They may have to do with the jury's subjective professional judgements. In particular, the way of representing the projects are mentioned such as 'perspective images are breathtakingly beautiful' and 'presentation may appear

having too flashy and conventional 3D's'. The form of representation was also not specified by the evaluation criteria in the design competition brief, while its degree of importance during the evaluation process was definitely not trivial. Derived from the long tradition of design competitions, the role of jury during the evaluation process of Espoo and Kotka was quite strong, assessment remarks such as how the jury should work are clearly stated such as 'Jury work has to do with maturing and giving the projects time to evolve in front of us' and 'They should definitely study the projects followed by reading this critique', indicating the municipality of Kotka. It is elucidated that the design tradition and the role of the professionals has an impact on the ways of judgment during the competition evaluation process.

In general, the results of the case studies indicate that the design competition involved both objective and subjective judgements. The procedural factors set up the framework, steering the operation of competition and crucially affecting the degree of subjective judgements. For example, in the case study of Kotka, the jury suggested the types and forms of design competition of arranging a new invited competition with the most prominent teams of this competition to reprogram their developing strategy and therefore redefine their design issue and strategy. They also pointed out the importance of giving the design projects time to evolve during the evaluation process. If the competition procedures clearly specify the general guideline, evaluation criteria, type and forms of competition and ways of evaluation, the subjective judgements which are difficult to qualify and quantify can be avoided to a maximum degree. On the other hand, the flexible space left either in the description of the design quality or the competition process may also enhance the innovation of design proposals. In short, types and forms of design competition should not be restricted but be adapted with the various contexts of actual projects in order to have better communication among the stakeholders involved. I thus propose to set up different models of design competition on respective projects to promote urban development overall.

As revealed in my comparative diagram 13 and 14, It is manifested from the jury report that the defined design issues and concepts in the case of Kotka site are crucial to foster the design solution overall, which represent the significance of forming the design issues appropriately. The Europan 9 design competition of Espoo and Kotka in Finland was generally successful in the sense of promoting professional exchange and public awareness of the projects. The Europan 9 results have been published and corresponding exhibitions have been held. Professional forums were set up for discussing different winning proposals. Above all, the competition enables us to set up a system to promote communication and thus foster the competition tradition, which is vital to sustainable urban development.

This study demonstrates that the boundary objects of design competition are interacted and practically affect the forming, evolving and implementing of

design knowledge of the competition. Moreover, the procedural design of Shanghai World Expo 2010, the strong Europan 9 institutional arrangement, the profound Finnish competition tradition and the well-documented competition database served as 'linkage boundary objects' to push the evolvement of the inter-language generated towards the implementation phase. Based on the analysis, I came again to the key point of 'how to produce and facilitate the inter-language generated by the competition?' This question is closely related to how the organizer perceives the design issues, how it organizes the design competition, who participates the design competition and how the entries are evaluated.

How to facilitate the flow of inter-language in terms of leveraging quality design knowledge associated with project conditions? In the case study, the dialogue based competition scenario in phase 1 of Shanghai world Expo 2010 case greatly supplies innovative inputs, which consolidate the feasibility of design initiatives of the sponsor. In summary, the well-defined design issues and concepts from the consolidated design objectives are crucial to foster the design solution overall, indicating the significance of an inclusive, appropriate and integrative inter-language of the competition.

5 Discussion on the case studies

All the case studies were analysed from both the macro-level and the micro-level in a comparative perspective (see table 7). Firstly, the macro conditions in which competitions were undertaken were mainly analyzed in the chapter 3. Accordingly the historic development trajectories of international design competitions in the country level were traced, elaborated and summarized as a background picture. Both the similarities and differences between the running procedures of the design competitions were given, together with introductions to the countries' socio-economic facts. From the country level, the aim is to scrutinize the relevance of generating trading zones in the context of international design competitions and to study the explanatory capacity of the concept in the case studies in both Finland and China.

The micro-level studies of case 3 and 4 focus on the details of the projects. By doing so, the aim is to trace how boundary objects have been interacted, developed, and to reveal if they have constituted a trading zone, to facilitate mutual 'translations' between actors from different fields.

The criteria of analysing the case studies are based on the conceptual tools of trading zone and boundary object, that is to say, to identify the boundary objects, to trace the flow of interlanguage and identify the trading zone. The collection of data for elaborating all case studies relies on similar types of data sources:

1) Government laws;
2) The official design competition conditions, announcement, brief and the competition evaluation (Jury report);
3) Institutional rearrangements;

4) Public review and news in the local and national newspapers, on professional forums and in official announcements.

The author strived to seek for all possible opportunities for interviewing relevant stakeholders. In this respect, the data are acquired with different methods according to the conditions of the case. For example, in the case 1, the personal

interview with the responsible personnel was performed. Case 2 was supported by the interview data proceeded by Prof. Martin Bechthold. However, both case 3 and 4 were mainly based on the professional review, since personal interviews were not possible to arrange. Nevertheless, in accordance with the research design, case 3 and 4 mainly focused on the competition procedures in a comparative fashion.

The data elaborated from various levels and channels are compared and examined combining perspectives of both public and private, professional and non-professional, experienced and young, during the analysing process to foster credibility. As explained in 2.4.1 conceptual framework studies, the systematic view of international design competitions laid the basis for tracing different aspects of international design competitions (competition specification, selection process and results evaluation).

Table 7.The clarification of conducting Cases 1 & 2

Depth and level of case studies		**Methods**	**Questions addressed**	**Data level**
CASE 1 International Design Competition of Baietan, Guangzhou in China **CASE 2** International Design Competition of Low2No in Finland	**Country level:** The aim is to scrutinize the relevance of generating trading zones in the context of international design competitions and to study the explanatory capacity of the concept in our particular case studies in Finland and China.	Literature review, Document analysis, Content analysis (e.g., plans, models, renderings) Context analysis, Interviews	Background study of international design competitions in Finland and China: Are the international design competitions of Low2No and Baietan meaningfully analyzable in terms of BO and/or TZ concepts?	-Government laws -the official design competition conditions, announcement, brief and the competition evaluation (jury report). -institutional rearrangements - public review and news in the local and national newspaper, on professional forums and in official announcements

Table 8.The clarification of conducting Cases 3 & 4

Depth and level of case studies		Methods	Questions addressed	Data level
CASE 3 International design competitions of Europan 9 in Finland	**Project level :** To trace how boundary objects of international design competitions have been interacted, developed and if they have constituted a trading zone, to facilitate mutual 'translation' between actors from different fields.	Literature review, Document analysis, Content analysis (e.g., plans, models, renderings) Context analysis ICF (design issues, design concepts and design forms)	What findings can be made on the interaction that took place in these competitions when they are analyzed in terms of BO and TZ concepts?	– Government laws – the official design competition conditions, announcement, brief and the competition evaluation (jury report). – institutional rearrangements – public review and news in the local and national newspaper, on professional forums and in official announcements
CASE 4 International design and planning competitions of Shanghai world Expo 2010				

After the comparative analysis on the case studies in chapters 3 and 4, questions such as what are the boundary objects, how were the trading zones developed by means of tracing the development of interlanguages during the design competitions, were answered. These findings served as the definition of the research problem for the action research: how to facilitate the sustainable design knowledge flow, based on the results of previous case studies? In this respect, the action research was meant to put the theory into practice. Obviously the 'dialogue-based design competition' of the action research is still in a small-scale and cannot be compared to the case studies in previous chapters. Nevertheless, the action research examines the findings with a practical perspective and can be justified in future work.

6 Design Competition, an Action-research Approach to the Trading Zone

6.1 Overview

Through the analysis of previous cases, I have elaborated the dynamics of the 'designed trading zone' coordination process. This process offers the chance to better understand the changing context of knowledge exchange. The interpretation of previous case studies is taken as a preliminary foundation. In particular, the findings on the lack of engagement of young professionals in international design competitions gave us the initiative to look into design competition in China with a bottom up approach.

Methodologies for intervention (e.g., workshops, lectures and discussions) are used in this chapter. The main aim of this chapter is to explore how the design knowledge was produced and applied by participants (e.g., competition organizers, young architects, experienced architects and clients) of the design competition. The core concepts and theoretical foundation of action research have been introduced previously (see 2.4.3.3). The aforementioned case studies in connection to the action research have been discussed, and generalizations on how the trading zone and boundary objects facilitate the knowledge flow are summarized.

6.2 Dialogue based design competition – action research as a methodology

6.2.1 Dialogue based Competition as a 'designed trading zone'

Based on the previous analysis, the action research on the 'designed trading zone' is described in Diagram 15, as follows:

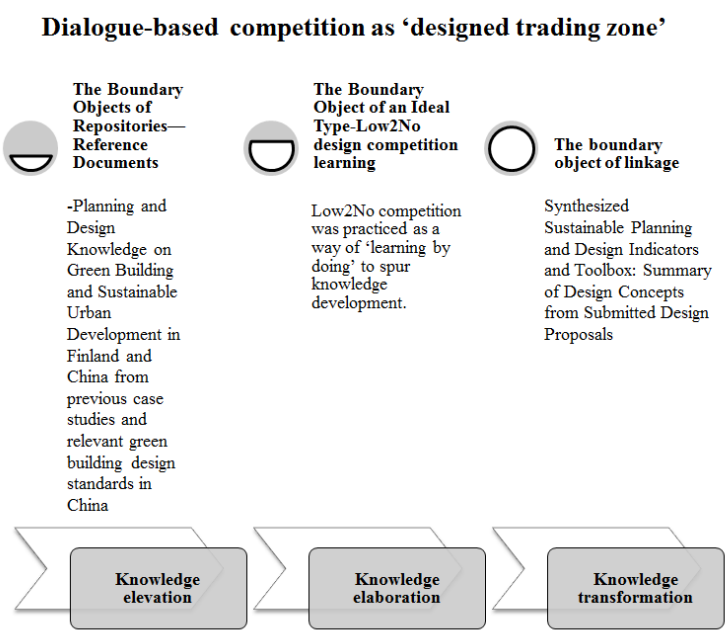


Diagram 16. The knowledge flow during action research.

The aim is to write text and outline an inclusive, appropriate and integrative 'inter-language' model of the design competition by proposing sustainable design and planning strategies, indicator system and applications.

It is assumed that the competition procedure was a mechanism to promote learning. Meanwhile, it is important to avoid the one-way knowledge transfer process, lecturing, and to advocate intensive communications to avoid misunderstandings with the dialogue based competition.

The Boundary Objects of Repositories—Reference Documents

The reference documents aim to supply Planning and Design Knowledge on Green Building and Sustainable Urban Development in Finland and China (i.e., Baietan Guangzhou, Shanghai world Expo 2010, Low2No, European 9 design competition and relevant green building design standards in China). These reference documents served as pre-competition integration to enrich the inter-languages of the dialogues.

The participants get trained by these reference documents. The competition briefs for the Baietan Guangzhou project, for the Shanghai world Expo 2010 project, for the Low2No project, and for the European 9 project were studied.

The Boundary Object of an Ideal Type

The Low2No Competition served as the boundary object of an ideal type. The Low2No competition was practised as a way of 'learning by doing' to spur knowledge development. As previously analysed, the Low2No Design Compe-

tition in Finland was a bottom-up approach to promote systematic innovation, which is currently lacking in China.

The curriculum of sustainable planning and design strategy, indicator system, and applications are first introduced via lectures and seminars. As learnt from previous cases, the conventional text-based design competition brief may retain misunderstandings between the architects and clients. The presentations include plenty of conceptual diagrams to spur effective discussions between the participants. The possible communication gaps are thus greatly reduced.

The boundary object of linkage: sustainable design strategies and indicators
By inviting speakers from local architectural firms and experienced architects into the evaluation discussions, the platform of transferring the design and planning knowledge in connection to local conditions is established. Based on the previous studies, the design experience needed to synthesize a design competition model was achieved. The synthesized Sustainable Planning and Design Indicators: summary of Design Concepts from Submitted Design Proposals were designed to serve as the boundary object of linkage.

6.2.2 Action Research Methods and Goals

The action research involved the sub-cultures of young architects; local, experienced architects; urban developers; and international academics. Besides the young architects, the local developer and experienced construction manager were also involved in the action research. They promoted communication and integrated the participants into the project. The participants' ages ranged between 21 and 35 years old. They represented the three important parties involved in the typical Chinese competition for young professionals. The interviewees were met in the office of the local developer and construction manager, and the interview dialogue was mainly in Chinese.

The action research is based on analyses of previous cases in this dissertation. The Chinese young architect's role in the design competition is essential for introducing sustainable urban planning and sustainable design. Therefore, suitable Chinese candidates were interviewed. The interview guide-questionnaire included both closed and open questions (see Appendix 1). All the questions addressed the relationships between sustainable urban development curriculum and the phases of design competitions: briefing stage, jury evaluations and synthesis. Moreover, the Chinese architects reflected on sustainable planning and design strategy, indicators and applications during the process. Five young architects and urban designers who were heavily involved in the training via submitting design proposals were interviewed. The directors of these five young architects and urban designers were also involved in the process and were interviewed openly during the jury evaluation process.

The specific goals of the action research are below:

1. Contextual Studies. With a systematic overview on how young architects and urban planners perceive sustainable urban design strategy, indicators and their applications before the competition, relevant documents were collected, explained and analysed as contextual studies for analysis.

2. Problem Identification. The problems to be investigated were identified from the previous case studies. The identification is continuously improved by reflection on actions.

3. Observation by Collecting and Analysing Data
   Indicators and strategies of sustainable urban design were collected and analysed after the competition.

4. Reflection and Synthesis. A comparative analysis and synthesis of the findings creates a dialogue for identifying barriers, opportunities, and constrains of intricate interrelations of the training.

6.2.3 The design Ideas Competition on Sustainable Planning and Design Strategy, Indicators and Applications

A design ideas competition (first design draft submission Date, 13rd August 2014 and final design proposal submission date, 20th August 2014) on sustainable planning and design strategy, indicators and applications was held in advance. The workshop started with a presentation on the goals to promote communication about sustainable planning and design strategy; indicators; and applications of the competition. The workshop continued with individual presentations, brainstorming activity, and open discussions. Individual presentations applied the curriculum of the Low2No case. The participants were required to make their own design proposals on the Low2No competition announcement. By individual presentations on Low2No design task, participants became acquainted with sustainable design and planning knowledge for a physical project, shared their understanding with others, and finished by implementing the curriculum with an experienced architect and construction manager. The following questions were addressed:

- How is sustainable planning to be understood, what would be a sustainable design strategy, and what would be the relevant indicators?
- How can these answers be incorporated into a Chinese model and put into practice in China?

Observation of the design activities occurred at the same time. The brainstorming activity introduced ideas on sustainable urban development, parameters and indicators. The parameters and indicators are the key issues: sustainability framework, carbon footprint, and relations between building and city with respect to sustainable urban development. The open discussion helped to

collect the reflections of brainstorming activity of the participants. Reflections included successes and barriers that they encountered during the writing of the first draft of the design proposal. The final individual presentations on design proposals were organized. The group discussions and presentations were held right after the final individual presentation on design proposals. Group participants were in teams of 2-3 members. Each group was allowed 5 minutes of personal reflection and 3 minutes of role assignments: note taker, time keeper, and presenter. Ten minutes was allowed for group discussion, and 10 minutes was allowed for sharing with jury evaluation. Everyone addressed the essential question, how can I incorporate a sustainable design and planning indicator system into my practice? The jury evaluation was based on the open discussions about the documentation within the winning proposal. The final session was a synthesis of the whole process, packing the toolbox of each participant with shared resources.

6.2.4 Competition workshop summary

There were a total of five submitted design proposals. Fourteen participants including the building director, young architects, young urban developers and experienced urban developers represented the architectural firm, clients and academics. The workshop started on July 21st, 2014. Through the dialogue based design competition process, five design proposal submitters were interviewed with a customized interview guide-questionnaire. All of the five design proposal submitters answered the questions accordingly. The participants were a group of young professionals, and their demographics and professional profiles are summarized:

- Gender: 5 women and 9 men
- Age range: 21–35
- Number of years in profession
  - 11 young architects and urban developers: 1–3 years of experience
  - 3 experienced professionals: 10+ years of experience
- Education:
  - 9 with bachelor degree in architecture
  - 2 with bachelor student in the university
  - 1 with bachelor degree in urban design
  - 1 with master degree in architecture from South Korea
  - 1 with master degree in urban design from Italy
- Workshop role:
  - 5 interviewees worked in architecture, urban design and planning
  - 4 worked as project leaders
  - 5 others joined the workshop without submitting design proposals

Figure 36. Workshop field work pictures.

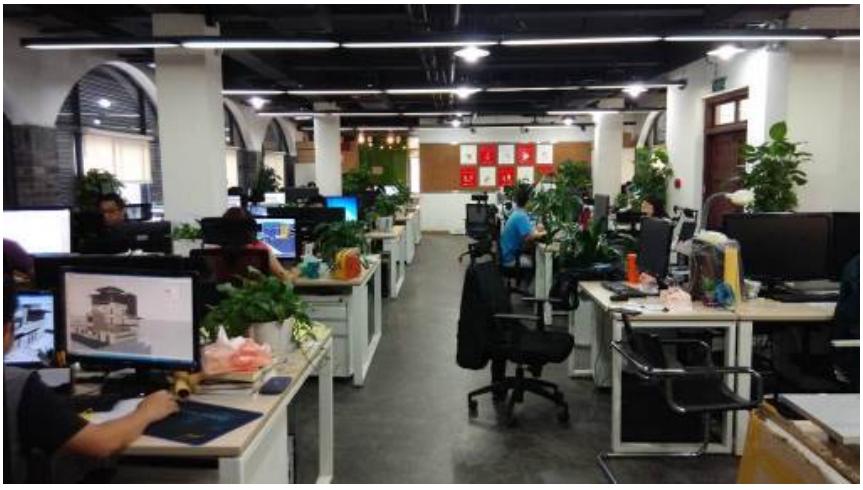


Figure 37. The office of the architectural design company.

6.3 Design Drafts and Final Design Proposals of the Workshop

Young Architects' reflections on Design Competitions

All except one participant participated in the design competitions. All participants followed the design and planning trends by attending professional seminars and by reading journals, forums and relevant websites (e.g., building supplier websites, architecture websites, and bulletin board systems). More importantly, they all emphasized the importance of comparative learning from relevant case studies. As an active coordinator of the workshop, I was responsible for ensuring that the design competition proceeded well according to the specified aims. My group mates are described below for reference.

Participant No. 1

- Age: 26, master degree in architecture from South Korea, 1 year's working experience

Participant No. 2

- Age: 26, bachelor degree in architecture in China, 1 year's working experience

Participant No. 3

- Age: 26, bachelor degree in architecture in China, 1 year's working experience

Participant No. 4

- Age: 23, bachelor study in architecture in China, fourth-grade student in the university

Participant No. 5

- Age: 21, bachelor study in urban design in China, first-grade student in the university

Due to time constraints, the biographies of the other 9 participants were not recorded. Only submitted design proposals with particular sustainable design concepts are represented, as follows:

Participant No. 1

Participant No. 1 is a young female architect with an international master's degree. She emphasized that her university supervisors gave her curriculum for professional learning. She actively participated in seminars and professional trainings on design and architectural planning. She was aware of the time limitation on the workshop and emphasized that it cannot guarantee a comprehensive understanding of design issues. She stated, 'I do think that it is very important to investigate relevant studies and case studies, compare the similar cases both internationally and locally to define the design concept of the project'. From the submitted design draft and final design proposal of Participant No. 1 (see Figures 38 and 39), it was revealed that the design concept was upsold from 'atrium greenry and pedestrian walkways with considerations of wind and sunlight direction' to 'a building complex's healthy-air atrium with greenery, rainwater collection platform, and solar roof with both glazing and integrated photovoltaic cells to produce electricity for the building complex'.

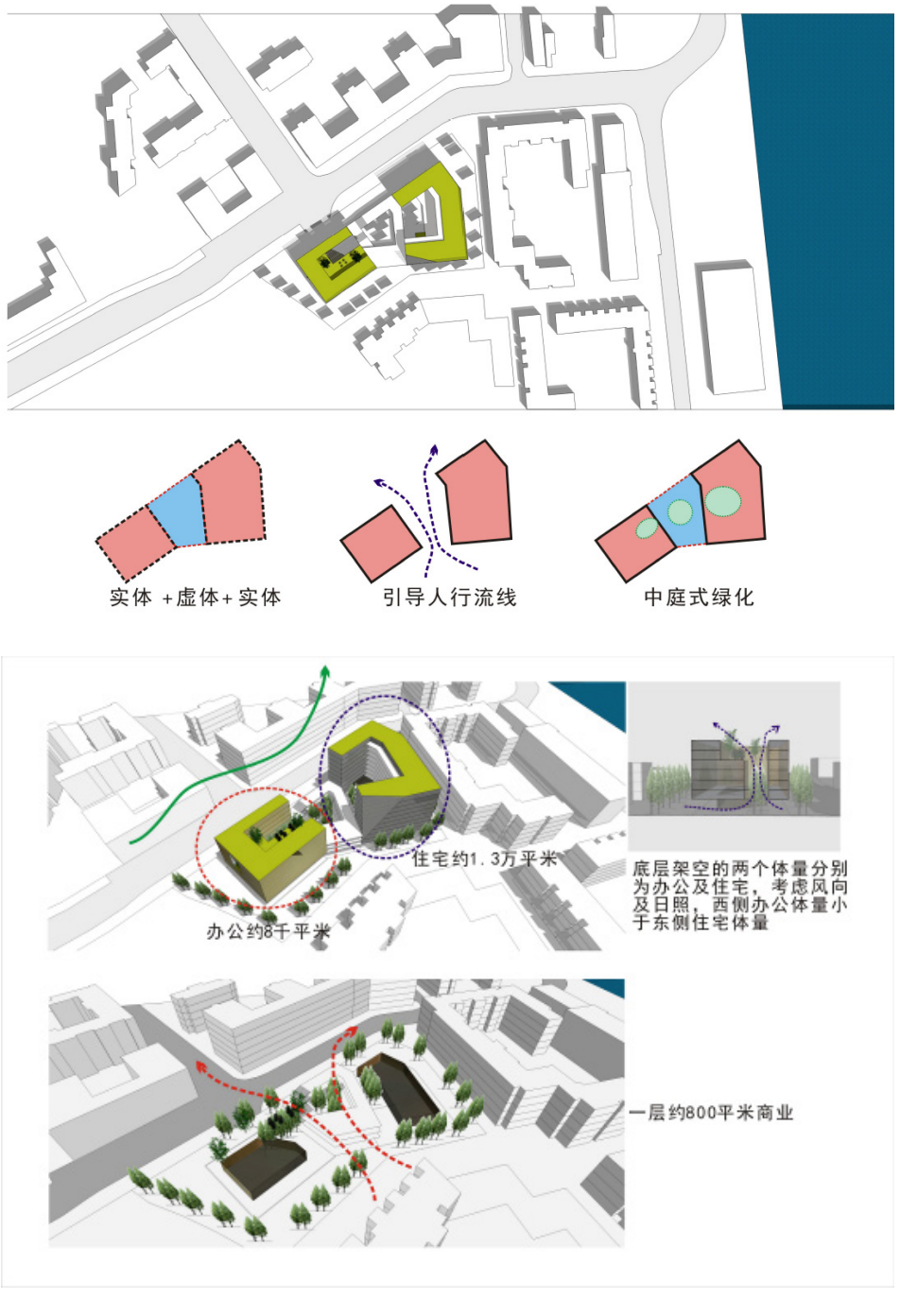
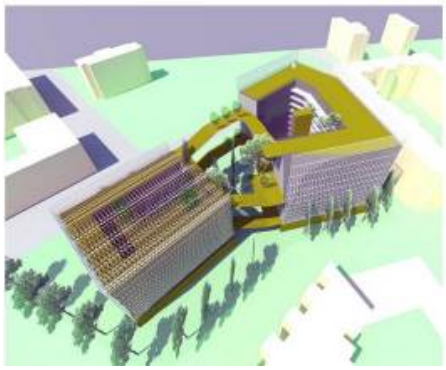
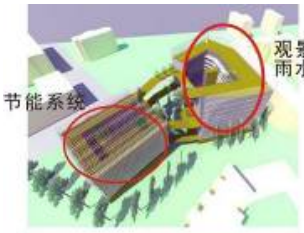
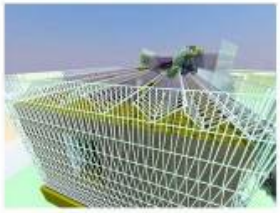


Figure 38, Design draft on Low2No design task from Participant No. 1.
Note: the pedestrian flow considers both wind and sunlight direction to the atrium's green grass.



在连接两个体量的部分，由绿色纤维水泥建成的主梯盘旋而上，在大楼中央围合成螺旋形，将行人引导至屋顶露台可观赏到海湾美景，同时也具有实用性如发生火灾，可以提供便捷的逃生通道，且开敞的空间提供了良好的自然通风系统，盘旋的绿色主梯加上中庭景观构成的建筑的绿肺系统





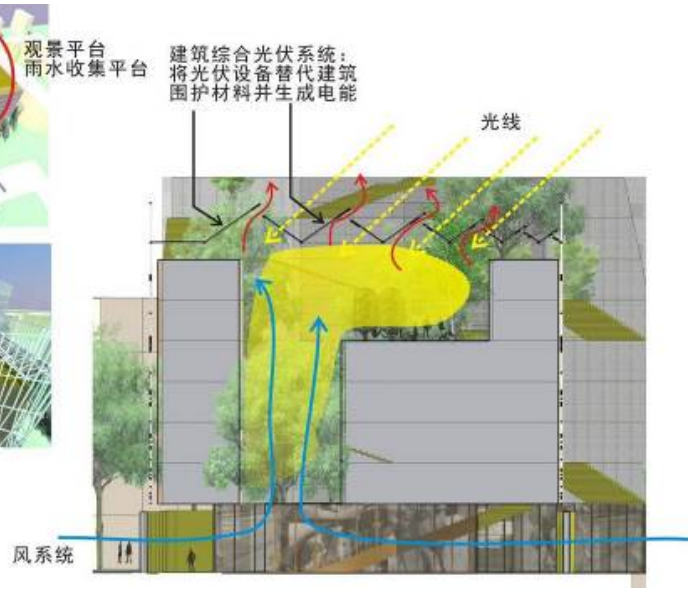


Figure 39, Final Design proposal on Low2No design task from Participant No. 1.

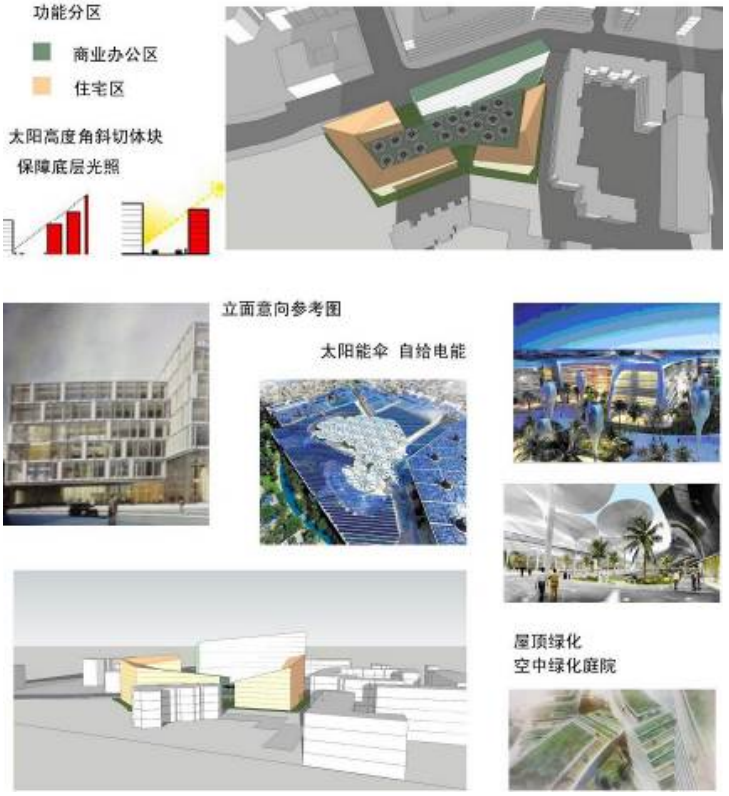


Figure 40, Design draft on Low2No design task from Participant No. 2,
Note: Solar photovoltaic roof to supply electricity and courtyard garden

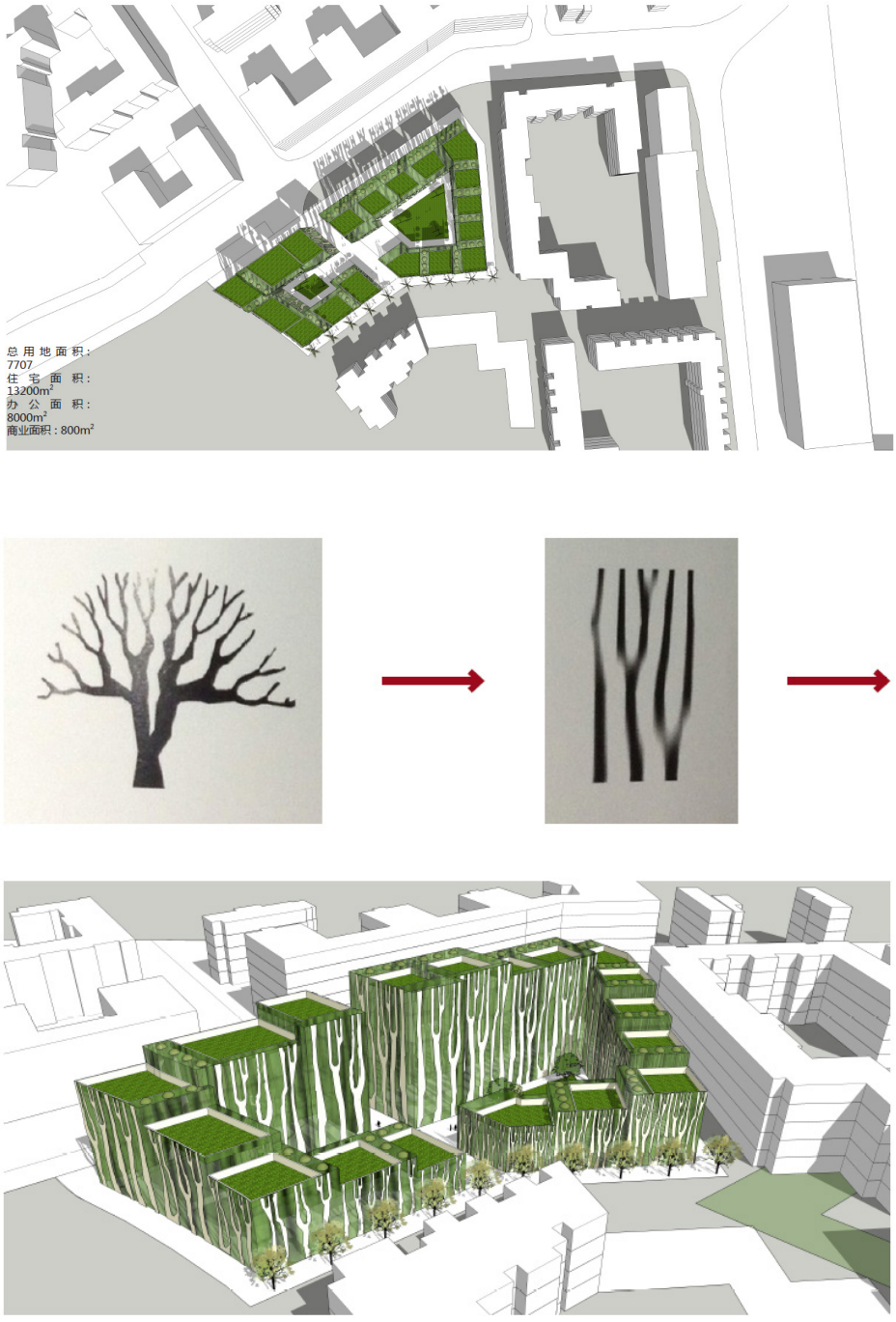


Figure 41, Final design proposal on Low2No design task from Participant No. 2, design concept includes roof and courtyard garden with pesticide-free trees.

Figure 42, Final design proposal on Low2No design task from Participant No. 2. The design concept includes green lighting shaft; roof and facades; rainwater collectors; solar photovoltaic roofing to supply electricity; energy saving glazing; demand-controlled ventilators; green construction materials and prefabricated construction materials.

From the submitted design draft and final design proposal of Participant No. 2 (see Figures 40, 41 and 42), it is revealed that the design concept has been upsold from 'Solar photovoltaic roofing to supply electricity, roof and courtyard gardening' to 'Green lighting shaft; roof and facades; rainwater collectors; solar photovoltaic roofing to supply electricity; energy-saving glazing; demand-control ventilators; green construction materials and prefabricated construction materials.' Participant No. 2 ignores international design and plan-

ning journals because her language skills were limited. She acquires design knowledge mainly from an internally-shared database in her employer's design company. However, from the comparison of the submitted design proposal, she presented both advanced design concepts and high technologies which were recently introduced abroad.

Participant No. 3 emphasized: 'By means of comparatively studying relevant case studies, I can avoid repetitions and get updated with knowledge for my own innovation'. Based on his experience in student design competitions, Participant No. 3 also summarized that the final phase of refining the design proposal was the most challenging part to accomplish a good design solution. He intended to learn design knowledge from project competitions, which are more practical in his perspective.

Participant No. 4 again emphasized the importance of learning with a comparative approach to relevant case studies. He has participated in two international design competitions and was eager to learn more by participating again. He highlighted his recognition of the importance of the competition brief from the perspective of clients.

All participants stressed the importance of sustainable urban development in China. This consensus is in the agreement of the direction of design concepts. However, they also admitted the difficulty of practical adaptions due to the different perceptions and backgrounds of inhabitants. They proposed that the key is to change the peoples' perception of sustainability at the ideological level. Participant No. 2 stated,

> The realization of sustainable urban development in China depends on the relationships among government, society and individuals in terms of relevant regulations. The regulation or policy is extremely important. Everybody is concerned with their quality of life. If they understand that sustainability is closely connected with their quality of life, they will change their behavior towards sustainable development. The bottom-up approach and systematic understanding are necessary to promote sustainable design in China. In this respect, the Finnish experience is very valuable.

As he learned from the Finnish experience, Participant No. 3 highlighted the importance of an interdisciplinary approach in forming the sustainable urban development strategy and ensuring the contribution of each party involved.

6.4 Analysis of Interviews

The interviews were grouped into both structured interviews with a guide-questionnaire (see Appendix 1) and unstructured ones with open questions during the discussion session (see Appendix 2). During the workshop, the participants, including the building director and developers, were interviewed in

a free manner. As the main research objective is to explore the learning process of young architects and urban planners, the interviews were thus deliberately addressed to the young professionals who submitted final design proposals. This analysis provides a summary of the reflections of the young professionals after learning about sustainable urban development by a design competition.

To find out how young professionals acquire design knowledge, put it into practice and finally improve professional ability, a devoted section of the questionnaire was designed to include quality aspects: habitual design actions, design competition, and workshop evaluations (see Appendix 2).

The interviewees were asked to define their design habits, their experience on design competitions, and to give feedback on the workshop. The results are representative responses and show both their ways of learning architectural design and their dealing with design competitions.

6.4.1 The reflections of the dialogue based design Competition as 'designed trading zone'-the Boundary Objects of Repositories — Reference Documents

Participants gave memorable descriptions about brainstorming. Participant No. 2 is the only one without previous experience of design competitions prior to the workshop. She later highlighted the impact of the design competition in terms of learning,

> I feel that I am stimulated by the mechanism of the design competition. The intensive communications and integrations gave me space for reflecting more on knowledge input. In particular, the brainstorming session is valuable for defining the design concept dealing with the design tasks. I am willing to participate in more design competitions to improve my professional skills.

The building director of the architectural design company stated during the session of brainstorming,

> I have considered the knowledge of green building and sustainable urban development as something incomprehensible before the competition. Now I feel that the concepts were not so complicated.

Participant No. 1 also stated,

> I do agree that learning by doing will help young professionals to obtain more knowledge in a timely fashion. The understanding of the design competition brief is very important. The brainstorming process provided me the knowledge basis of sustainable urban development and green building. The evaluation part of the design competition gave me the chance to effectively communicate with others. During the competition, the representation of the design concept is not as important as the development of the main design concept. From my design

competition experiences, I felt that design concepts are more important than design representation.

Participant No. 3 pointed out: 'I was used to dealing with design tasks in a group, now I think I am able to individually deal with different phases of the project design'. Participant No. 4 also highlighted that the brainstorming process helped him to access more knowledge and thus deal with design tasks with wider perspectives.

6.4.2 The Boundary Object of an Ideal Type-Low2No design competition learning and evaluation discussions

Evaluation discussion activity is described as below:

The evaluation process was a four-step process: 1) groups formed, 2) questions given, 3) 5-min personal reflection, and 4) 10-min group discussion with roles and jury panel. The evaluation discussions were arranged in groups with 2–3 participants. The following questions were addressed during the interview:

- How can I incorporate sustainable design and planning knowledge during the competition?
- What are the major challenges and how do I conquer them?
- How and what do I learn from others in terms of dealing with design challenges?

The process allowed five minutes for personal reflections and ten minutes for group discussions on different ways of approaching design tasks and applying design knowledge. The jury panel stimulated the intensive communications with roles: presenter, note taker, and time keeper. The jury panel identified the advantages and disadvantages of each proposal.

The participants gave positive evaluative summaries. All participants stated that they have learned during the competition evaluation discussion. Participant No. 2 also considered that she learned more from the evaluation part of the workshop, 'The evaluation of design proposal provided a clear framework on our professional knowledge and offered us the chance to communicate and compare with other professionals.'

On the other hand, participants also highlighted that the daily work load and time limitation hindered them in learning. However, the discussion process gave participants the chance to reflect their various ways of acquiring, elaborating and expressing their new knowledge. The discussion opportunities were greatly appreciated. Participant No. 4 was the youngest at 21 years old and stated that she could not fully understand the competition brief, but she was able to learn more from the other participants about design, presentation and persistence.

The commonly perceived difficulties are the application of design knowledge into the design concept representation and the time limit of the design competition. The competition evaluation session greatly promoted the communication among the participants and offered them the chance to state themselves the terms of sustainability, use their presentation skills, and communicate. Participant No. 3 stated,

> I don't know how to represent the design strategies with respect to sustainable urban development. The learning case of the Low2No design competition helped me with respect to how to represent systematically design thoughts, which in my case are fragmentary.

Participant No. 5 also agreed,

> I do appreciate the efficiency of the workshop. However, the time limit cannot allow us to do more investigations on the project site. Therefore this is a lack of data for further design.

Participant No. 1 also stated,

> I have participated in several international student design competitions and I have been involved in actual field trips. Under the time limitation of the workshop (one month) and other conditions, it was difficult for us to proceed with the field trip and this will hinder the development of a better design proposal.

The representation of design concepts into professional diagrams is also perceived as a challenge because the curriculum did not supply the technical details.

The jury panel was composed of the following representatives:

- Building director of Ha Long Kay – Solution Centre, Qiu Chen
- PhD candidate of YTK Land Use Planning and Urban Studies Group at Aalto University, Zheng Liang
- CIFI real estate manager, Yi Liang

The evaluation criteria are below:

- What are the sustainable design indicator systems and strategies in the design proposal?
- How are those strategies and indicators applied and represented in the design proposal?

In this competition, all the representatives of the jury panel promoted communication and integration of participants during the workshop. Qiu Chen is the building director of Ha Long Kay Design Institute and is responsible for the Solution Centre. During the jury evaluation discussion, she pointed out that some of the participants have not shown their professional capacity in the

design proposal, but others have improved significantly based on their daily work. Yi Liang, a CIFI real estate manager, who is also a client of Ha Long Kay, stated that the workshop greatly promoted the communications between the architects and the clients. He suggested the design evaluation as ways of putting the evaluation as a way of presenting advantages and disadvantages of each design proposal without selecting a winning proposal. His reasons were based on his observation: all the submitted design proposals were surprisingly well-formed in such a short time. This view was shared by the other two jury members.

6.4.3 The Boundary Object of Linkage- sustainable design strategies and indicators

At the end, advantages and disadvantages of each proposal were identified and sustainable design indicators were accumulated, compared and synthesized as bellowed:

Building complex

Sustainable design vision: For example, nature integration is a vertical greening wall to rebuild internal natural environment. Also, modular space arranged to increase the flexibility of the building space.

- **Cultural understanding:** beverages (e.g, coffee vs. tea), sea, forest, lighting, coldness and bicycle
- **New technology:** double skin of buildings
- **Lighting:** roof cutting to evenly distribute sunshine, solar lighting systems, light wells, skylights, adjustable shutters, and atrium lighting
- **Warming:** triple glazing window panels
- **Heating:** solar-powered heating
- **Architectural space:** the use of the space under a staircase and just below a roof; courtyard greening space; and diffused commercial space to connect other functional spaces
- **Ventilation:** natural ventilation system (e.g., doors and windows); intelligent ventilation adjusting system (e.g., central air conditioning system)
- **Water**: the platform for collecting rain water
- **Electricity:** photovoltaic cells
- **Elevator:** energy-producing elevator

City

- **Sustainable design indicators:** public transportation, bicycle lanes, electric bicycles, and pedestrian streets
- **Public space:** courtyard green space and community park

- **Renewable energy:** solar energy, wind energy, hydropower, biomass, biofuel, and geothermal energy
- **Construction:** prefabricated construction to reduce construction-induced pollution
- **Local material:** use locally-renewable material.

Country

- **Sustainable design strategy:** low-carbon emissions, high-R factor building envelope (e.g., insulation, glazing products) and collective heating system and water-saving system.
- **Zero-carbon emission:** renewable energy such as solar energy and wild energy
- **Negative carbon emission:** green system

Note: In China, only one supply strategy exists at the national level

The summary of design concepts as 'sustainable design indicators' from submitted design proposals was designed to serve as the boundary object of linkage. Through the linkage boundary object, the participants were able to elaborate, share and reflect the design knowledge with the help of 'interlanguage' from the 'sustainable design indicators'. It has showed that the sustainable design indicators indeed helped the communication and coordination based on the interviews (see 5.4.1). However, it is still not clear that how these 'interlanguage' will affect them after the competition. Further research is suggested to follow how these indicators affect design knowledge flow in a longer term.

During the design process, there are various sustainable indicators proposed in the design proposals with respect to complex building and urban planning. However, there is only one participant who stated clearly the relations between the national design strategies, urban planning and building complex design.

6.5 Discussion and Findings

In this chapter, I have explored design competition as a dialogue based platform. A design competition is a mechanism for stimulating learning and providing opportunities for communication instead of merely selecting a winning entry.

With the addition of action research to a design competition, I have revealed that the design competition is a 'designed trading zone'. The combination can help participants to learn themselves. The combination coordinates young architects, young urban planners, clients, academics, and building managers.

Based on the interview results, it was revealed that the design competition to a certain extent promoted the communication. As shown in the excerpts of the interviews, it is rare for the interviewees to communicate with each other and

clients in the scenario of rapid Chinese urban development. However, through the design competition, the three groups obtained a better understanding on how to apply their theoretical knowledge for a practical benefit regarding the needs of clients. Particularly, the intensive communications among the experienced architects, young architects, young urban planners, academics and clients can help lead participants to transform international sustainable design knowledge into local practices with a high degree of success. In short, the learning and application of sustainable urban design to real-world projects are fundamental in the bottom-up approach for a sustainable urban environment. During the workshop, the participants realized that the design process is a 'knowledge transformation process' with the following steps:

1. The introducing of sustainability theory in the brainstorming process with the help of boundary objects of repositories.
2. The application of the sustainability theory in local conditions with the help of the boundary object of an ideal type-competition evaluation.
3. Putting the learned knowledge into a practical design with the help of boundary object of linkage – the synthesis tool box.

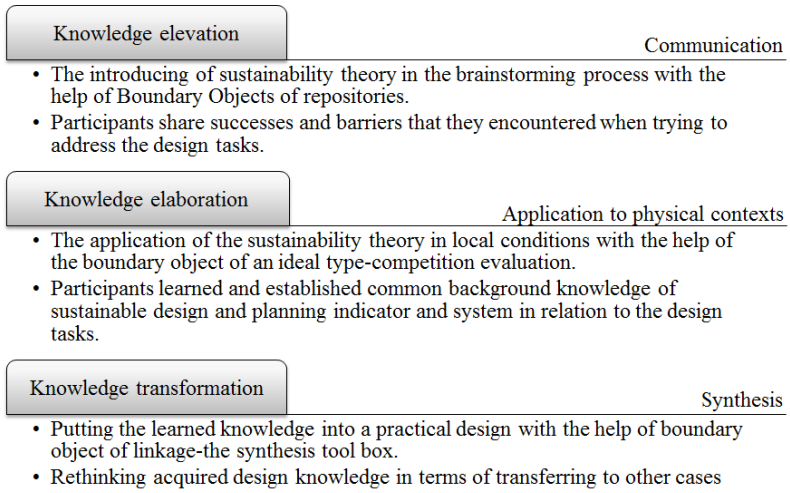


Diagram 17. Design process as 'knowledge transformation process'

However, it was noticed that the whole process was closely related to individual's professional background (e.g., ideology, university training and experience). The participants' understanding of the design issues, relevant sustainablity theory, communications with clients, and presentation skills are crucial to have the commonly-agreed design solutions meet with sustainability.

In short, the BOs bridge and promote the design knowledge transfer among groups with different professional backgrounds and experiences.

Table 9. The effective boundary objects during the learning workshop

Boundary objects	The boundary objects of Repositories – Reference documents or lectures, seminar and workshops	The boundary objects of ideal type	The linkage boundary objects – competition synthesis
Function	They bridged the participants by introducing the external knowledge and significantly improving coordination	The competition evaluation session constituted the platform for the participants who reflected on their professional skills	The synthesized sustainable planning and design indicator toolbox supplied the database for further learning

The boundary objects of ideal type and linkage (the evaluation discussion and proposal synthesis) are generally appreciated because they overcome the potential gaps of knowing and prevent misunderstandings. For example, in the boundary object of repositories, the author gave lectures and seminars which focused on green-technology buildings in the Chinese standards instead of European ones. The localization process (e.g. China-specific examples for Chinese participants) of sustainability, a foreign concept, was extremely important in this competition with Chinese participants.

7 Concluding Remarks

7.1 Overview

It is of great value to reveal the knowledge flow process through design competitions, due to the increasing importance of design competitions to our urban environment. The present study, therefore, focuses on the illustration of how knowledge was generated and transferred among different professional groups via international design competitions held both in Finland and China. The aforementioned case studies have repeatedly demonstrated the great potential of design competitions for learning and gaining design knowledge between varied stakeholders. Particular emphasis was put on the analytical concepts of 'trading zone' (TZ) and 'boundary object' (BO). The aim has been to conceptualize international design competitions as a device for generating and transferring knowledge among different professional groups. The employment of TZ and BO concepts helped to reveal how knowledge is transformed and integrated into different local conditions. The local conditions in the action research study of the previous chapter reflect a variety of professional groups with various occupational backgrounds. The representative groups include young architects, a young urban developer, experienced architects, academic institutions, the client, the local real estate developer and international participants. All of these stakeholders were integrated and involved in one competition.

As a 'designed trading zone', the design competition promoted design knowledge acquisition and learning for sustainable urban development. Via TZ and BO analysis, procedural innovations were revealed and promoted to facilitate the knowledge flow of an international design competition. Herein, the main findings of previous case studies and existing limitations, as well as outlooks are given.

7.2 Synthesis. Lessons Learned from Previous Case Studies: Pros and cons of international design competition

7.2.1 The Gaps in Knowledge Development of international Design Competition Procedures

Based on the four case studies (Low2No, European 9 in Finland, Shanghai Expo 2010 and GuangZhou Baietan in China), it was revealed that there exist potential knowledge gaps hindering the procedure development in the contemporary competition:

- *Competition Announcement*. In a contemporary competition format, either open or invited, the sponsor's design initiatives need to be written into a document with key points.
  Possible Gaps: This document with key phrases greatly helps or hinders the perception of messages from the perspective of potential participants.

- *Competition Conditions*. Normally a professional advisor helps the sponsor with the Jury board selection, selecting the procedural rules, and defining the design issues. The rules and definitions are to be obeyed throughout the competition.
  Possible Gaps: The role of independent professional advisor is critical in terms of defining design issues, setting up procedural rules and choosing the relevant jury board ensuring the quality of professional evaluation. As manifested from the Jury report in the case of Kotka site, it was crucial to foster the design solution overall, which represented the significance of appropriately worded design descriptions.

- *Competition Briefs*. The winning entries are selected on the basis of Jury's evaluation results, solely.
  Possible Gaps: It is possible that the evaluation criteria of selecting the winning entry are inaccurately connected to the competition conditions and brief. Furthermore, the Jury might judge the competition proposals on personal preferences. On top of that, major documents such as the competition brief are normally presented in text format, which is easy to be misunderstood by the participants.

In particular, competitors may also take the seemingly known or imagined preferences of the jurors into account in the phase of forming the main design concepts. Therefore, the roles and practical involvement of sponsor, professional advisor and other possible parties are critical during the competition process. This format highly emphasizes the importance of sustainable knowledge transformation with the help of boundary objects and the trading zone.

7.2.2 Comparison of the main characteristics of Finnish and Chinese international design competitions.

It was revealed that 'trading zone' (TZ) and 'boundary object' (BO) are usable in terms of illustrating the complicate interrelations of international design competitions. The main characteristis of boundary objects in chosen design competitions are necessary to identify in order to generate the 'designed trading zone'. Based on the case studies, it showed that the shift on competition rules, brief, RFQ and preconditions practically served as effective boundary objects to facilitate the establishment of the 'designed trading zone' to spur better communcations between the involved actors towards innovative urban projects. With appropriate design competition announcement, rules, conditions, brief, RFQ and preconditions, the balance of the interests of all involved stakeholders can be addressed. The strong commitment of the organizer and stakeholders actively pushed the evolution of boundary objects to the 'designed trading zone'. In the case of Low2No, the boundary objects of standardized forms and methods (competition procedures) are well-established with a strong consensus among the stakeholders involved, which ensure the proceeding of the design competition.

In particular, the publicly accessible competition data such as Jury report, competition brief and competition design proposals have provided important accesses for young professionals to learn, and for the public to participate in the discussions. The less defined competition rules functioned differently in connection to various conditions. In the case of Shanghai World Expo 2010, they helped to generate innovations such as the project site relocation idea. On the other hand, the unspecified competition rules may bring confusions and complications such as in the case of Europan 9.

It was clarified that the competition traditions have played important roles in the development of competition procedures and systems. In the Chinese cases, the competition rules were developed along with strong political and economic incentives. The role of professional organizations was thus not as strong as in the Finnish ones with respect to the development of competition procedures and system. The boundary objects of standardized forms and methods (competition procedures) were flexibly defined, according to the initiative of the organizers in China. However, along with globalization, Chinese professionals are increaslingly knowledgeable on sustainable urban development. The interrelations of stakeholders of a Chinese design competition are comparably complicated in comparison to a Finnish case. At this point, the boundary objects of repositories (competition results synthesis) were applicable in order to comply with the local conditions in China. Nevertheless the competition data such as the Jury report are normally not publicly accessible in China. It might in a way hinder the young professionals' learning and growth. As shown in the Europan 9 case, materials pertinent to competition evaluations such as sketches, maps, drawings, diagrams and models are publicly accessible. These open-access materials encouraged the futher development of design knowledge. In

the case of Shanghai World Expo 2010 and Guangzhou Baietan, the arise of new institution units and forms of competition procedures were critical in terms of better coordinating the design knowledge with local conditions. They functioned as linkage boundary objects to promote the transfer of design knowledge.

In short, the rigid format of contemporary design competitions generally requires effective communications among the stakeholders including organizer, professional-advisor, competitors, clients and users. Through the comparison of international design competition cases between Finland and China, it was shown that the competition rules, systems and professional organization have played a strong role in promoting design competition as a 'designed trading zone' for better communications and coordinations of urban planning and design. In particular, the users' design and planning needs are important, and should be involved and reflected in the pre-competition package. It would be beneficial to involve the public in specific projects via serious investigations ahead of the competition, such as by integrating the users' opinions into the competition program.

7.2.3 The synthesis from the action research

In this dissertation, it was found key to gain cooperative capacity among many stakeholders by means of specific and effective dialogue. The importance of preparation for an inclusive, effective and appropriate dialogue at the early phase of design competition has been revealed and emphasized again through the action research. In the action research, brainstorming, intensive lectures, and seminars gave participants a view to the sustainability theory for further discussion and exchanges. The participants represented three professional groups: the experienced architects, young professionals (e.g., architects and urban planners), and clients. The three groups played important roles in urban development. As I have revealed from the case study of Europan 9, the design competition was employed as an effective method for young architects to put their theoretical knowledge into practice. In the action research, the design competition was specialized for bridging the communication gaps (see 6.1.1) among the young architects, experienced architects and their clients in China.

As young architects with limited experience with clients and projects, the *inter-languages* generated during the competition process are critical to better understand their clients. In the 'designed trading zone', young professionals were offered the chance to learn, absorb and transform knowledge as part of their own professional knowledge systems and skills by means of better communication. This bottom-up approach of the 'designed trading zone' for young architects is critical for the sustainable urban development in China. To create and nurture a systematic, transparent and accessible knowledge sharing platform in China, we ought to give the young architects – the future managers of our urban environment – a central role in the knowledge era.

7.3 Facilitating the design knowledge flow by international design competition

It is known that local adaptation of the sustainability design model is critical for transforming international design knowledge into a local model. However, time limitations of international design competitions normally pose risks of adapting international design knowledge to the local context. A well planned time frame of design competition would greatly help and expand the knowledge transformation. As seen from the case study of Shanghai World Expo 2010, the strategy design with accurate milestones greatly helped to localize the knowledge acquired from the international design competitions. On the other hand, through the cases in Finland, the well-established Finnish competition system constituted the trading zone for the evolution of interlanguage in the design competition. The participation of young architects, experienced architects, the public, architectural community and international architects perpetuated the development of the design and planning knowledge in Finland. The well-established competition system and the consensus of stakeholders can serve as boundary objects towards the development of a trading zone in the process of local coordination.

In the case of the Low2No competition in Finland, a new paradigm towards national sustainability was deeply rooted in the conventional competition rules. Firstly, the innovative brief of the Low2No Competition successfully expanded and promoted the flow of sustainability design knowledge. Secondly, the definition of a sustainable design indicator system intended to create general, replicable and adaptable sustainability design knowledge, usable for similar projects either domestic or abroad. Thirdly, the design strategy intended to expand the use of knowledge in both temporal scale and application range, such as from the building complex in a city and into the societal level. The design solution of the Sitra Building Complex in a way defined the international sustainable urban development method in connection with local conditions (e.g. building site and local governance).

In the case of Baietan in China, the strategic planning of Guangzhou also started with a national-scale design competition. Although the competition participants of Baietan were limited to prestigious national and international professionals, the competition results were high-level, well-analysed and well disseminated in relatively good documents and publications. The consequent procedural changes and institutional arrangements have increased the efficiency of communications with knowledge integration. In the case study of Shanghai Expo 2010, the procedural design of adapting the knowledge flow into local Shanghai conditions greatly improved the project implementation. All these findings imply that the competition rules adapted, along with the local coordination process, promoted the knowledge flow, particularly after taking social, economic and political factors into account. Consequently, the flexibility of competition documents is crucial in terms of instructing the procedural dynamics, according to various project conditions.

In conclusion, to better use design knowledge in China, I argue for the development of competition rules and systems to facilitate the flow of inter-languages generated by competitions. First, international design competitions are, in a way, adopted to redistribute more power to the professionals, the organizer, the developers and the public. International design competitions offer learning chances for young professionals, who will be confronted with increasingly competitive markets. A well-organized archival system on the inter-languages generated will constitute a space for the evolution of inter-languages for the public and the young talents. Second, integrative approaches for the pre-competition and post-competition phases need to be addressed. As previously described, the implementation of a foreign design is mainly carried out by local professionals, whose cultural and professional orientations may differ considerably when compared to their Western counterparts. Moreover, the contextual requirements and the users' design and planning needs are important, and should be involved and reflected in the pre-competition integration to enrich the inter-language of the trading zone. Third, the open design competition has become a hot topic not only in the public media but also in the professional forum. In this regard, it would be beneficial to involve the public in a specific project of serious investigation ahead of the competition, such as by integrating user opinions into the competition program. This approach could effectively introduce more integrated design criteria to the designers and planners and aid in the generation of more appropriate design proposals. Other than focusing on place or name promotion through the usage of large-scale competitions, the balance of the interests of all stakeholders involved needs to be addressed before the competition to enable the generation of an inclusive and effective inter-language for the design competition. With an inclusive and effective enough design competition trading zone, we are able to not only re-image the city but also put ideas into practice.

This dissertation aimed to explore how to use an international design competition as a platform to facilitate design knowledge flow among different professional groups in a global scale. International design competitions have great potential to serve as educational tools in terms of producing and transferring design knowledge. A novel combination of research methods, including trading zone and boundary object approaches, case studies, ICF formalisms and action research, helped to better illustrate both the procedures and the outcomes of design competitions, and also to pinpoint key factors governing the flow of transferrable knowledge.

The high degree of complexity of an international design competition makes it an interesting case in terms of design knowledge flow. It may serve as a platform for bridging knowledge components from various social groups. The interlanguage of design knowledge is generated and transformed, in reference to the local conditions. It was found in the study that flexible competition proce-

dures are important to form an enriched and balanced interlanguage, which in turn is essential to foster the 'designed trading zone'.

In the case studies in chapter 3 and 4, the boundary objects of repositories, ideal types, coincident boundaries, and standardized forms were found to be essential in terms of facilitating design knowledge flow. In particular, it was found that the boundary object of linkage has played an important role in the knowledge transfer process. The linkage boundary objects have played a critical role in ensuring the continuation or application of the generated interlanguage.

Further research is suggested to pursue in the direction of action research with more participants and interviewees such as the case study of Europan 9. How the professionals develop their inherent knowledge reference systems when confronted with an external knowledge transferring process would be very valuable to explore in future work. Along this line of thinking, a series of direct field studies and personal conversations with key stakeholders during the competition is of great importance for future study. This approach can better elucidate how the regulations, institutional engagement and design knowledge is transformed.

The archive documents of the research include government laws, the official design competition announcement, the competition evaluation public review and news in the local newspapers, on professional forums and in official announcements. The reliance on document interpretation from various levels of media could be criticized for its second-hand information. In addition, the subculture of the participants of the action research does not cover all the stakeholders of a design competition in China. For instance, local governors are absent from the action research. This absence may also limit the results.

The substantial Chinese-Western culture gap and complicated social and political background render a different trajectory for international design competitions, especially with the design competitions in China and Finland, which represent very different model of interactions with professionals, governments and the public. Four case studies were chosen based on the focus of sustainable urban development. The diverse procedural dynamics of the international design competition cases were revealed by means of utilizing the TZ and BO concepts in the analysis. The analysis focused especially on knowledge formation and development in the phases of the cases in the context of internationalization. However, it might be too early to jump to general applications of the results due to the limitations of the case studies. The analytical methods of TZ and BO have been applied to the urban planning and design field as previously argued. However, it is still unclear how they could be applied in the sense of general design competitions without stakeholders like decision-makers.

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Appendices

Appendix 1. Filled example of an interview questionnaire during the workshop (all interviews recorded in voice files)

Evaluating questionnaires on dialogue based competition
设计竞赛小组学习调查问卷

Reflection Questionnaire of dialogue based design competition (action research)

Please fill in the appropriate circle to indicate your level of agreement with statement s about your actions and thinking in this workshop.

请如实反馈此次工作小组的具体作用。 Participant No. 1

Design Habitual Action
设计知识

Age: 您的年龄 26

您通常会浏览和下载资料的相关专业类的网站是？（请描述名称，可多行）
How do you acquire design knowledge and skills?

上学自己收集的。相关例子
导师的资料库
学校学习表现手法 SU 3D 不常用

您的专业是：建筑设计， 本硕士都是建筑设计。
Your Major:

您对可持续性设计的了解？
How do you know about sustainable urban development?

- ☑ 偶尔关注这方面的内容，酌情参加
- ☑ 参加免费的分享和讲座，不参加付费的
- ☐ 付费的培训要看师资和授课内容评价综合性价比才决定是否参加
- ☐ 从不参加培训，偶尔听听讲座

您会关注一些设计类的外版杂志吗?
Have you paid attention to international design and planning journals?

☑ 经常关注，从国外网站或者国内网站订购 研究生时看 工作后比较少

☐ 经常关注，从网站下载pdf文件浏览

☐ 偶尔看看，但是不太好找比较全的下载网站　☐ 关注的比较少，一半看国内的杂志比较多

您自己的资料库内存有多大？ * (必填, 单选)?
What is the size of your professional data base?

○ 经常收集，有1个T以上的资料库内存　◉ 偶尔收集，500G以上的资料存储

○ 基本不收集，公司有资料库公用

您会参加一些论坛或者组织举办的培训和讲座吗（可以在选项后填写培训的机构与培训大致内容）？
Have you participated training and lectures with focus on sustainable urban development?

☑ 经常关注这方面的内容，积极参加

- ☐ 偶尔关注这方面的内容，酌情参加
- ☐ 参加免费的分享和讲座，不参加付费的
- ☐ 付费的培训要看师资和授课内容评价综合性价比才决定是否参加
- ☐ 从不参加培训，偶尔听听讲座

您认为调研相关资料及学习相关经典案例，通过国内外项目的纵向对比学习对设计项目做出合理定位的重要性
What do your think about the importance of investigating and comparing relevant case study in terms of defining the design concept at the early phase of design?

A. 非常有必要
B. 有必要
C. 一般
D. 没必要

您对业界分享知识和讨论的平台满意吗，您有何建议？
How you feel about the knowledge sharing platform and what are you suggestions?

分享知识平台					
	很	基	一	基	很不满意
大学设计知识学习 学校内部平台	☒	☐	☐	☐	☐
与其他专业专家讨论平台 网站和分享平台	☒	☐	☐	☐	☐
国外设计知识融入平台 国内外都看 东西比较多	☒	☐	☐	☐	☐
国内专家学习平台 公司内部培训课	☒	☐	☐	☐	☐
设计知识实际应用 高强度，户型实际培训-公司提供	☒	☐	☐	☐	☐

Design competition
设计竞赛

您对设计竞赛是否熟悉？

How do you know about design competition?

A、非常熟悉

B、熟悉 大学参与设计竞赛。 国际学生设计竞赛，并有实际考察。 语言有限制。学习韩语一年

C、一般

D、不熟悉

您认为通过设计竞赛学习可持续性设计知识是否必要？

Do you think that it is necessary to learn design knowledge by means of design competition?

A. 非常有必要

B. 有必要　亲身实际参与会有更多的所得。

C. 一般

D. 没必要

您是否经常看到类似设计竞赛网站？

Have you visited website concerned with design competitions?

A. 经常

B. 有时

C. 很少

D. 无

您参加过设计竞赛吗，请详细描述您参与的竞赛与经历

Have you participated any design competitions? Please describe your experience in detail.

设计竞赛参与经验					
	非	很	重	一般	不
设计竞赛项目任务书 很重要	☒	☐	☐	☐	☐
定位与设计项目主要设计思想 非常重要	☒	☐	☐	☐	☐
方案的表达及基本处理方法 一般，设计思想比较重要	☒	☐	☐	☐	☐

您将来会参与设计竞赛吗？ 如果是，您会如何处理设计竞赛和日常设计工作之间的关系？

Will you participate international design competition, if yes, how would you handle the relation between design competition and daily work load?

公司参加会去，自己不会去，工作最重要。

您认为“通过设计竞赛学习可持续性设计知识”专题应侧重哪几方面的功能：（可多选）

Which aspects do you think should be emphasized in this workshop?

A　资源性功能

B　交流协作功能

C 专题研讨功能
D 其他

如果您认为应该有其他功能，可以写在这里：
If you think that there should be consider any other aspects than above mentioned, please state below:
_应该是研究型的，做的比较表面化，希望切身感受到研究型的，不要表面型的东西。希望有原创的，研究性的知识。

请写出您对此次共工作小组的建议： **Please state your general suggestions on this workshop:**

时间跨度和工作矛盾，上学参与，前期要做调研和研究才能有合适设计方案。一年竞赛，前半年对场地做调研，对地形情况有透彻了解。

工作小组
你对工作小组的整体感觉如何？
How do you feel through the participation of the workshop?

感觉还可以，刚毕业，抽时间做，有交流，参考书籍是公司的书。做出来的东西不一样，互相学习，并且有更加的交流。

你从这次工作小组学到了什么？
What have you learned from the participation of the workshop?

绿色建筑节能方面都不是很熟悉，对基础知识不是很了解。对细节不是很了解。还是了解了相关的知识。

您是否参加本次设计竞赛的所有部分（草图-头脑风暴-设计竞赛-知识综合与分享）？
Have you participated all the part of workshop and what do you considered as the important part in terms of learning?

设计竞赛工作小组组成部分					
	很	基	一	基	很不满意
设计竞赛学习草图部分 很满意，草图很满意。	☒	☐	☐	☐	☐
设计竞赛学习头脑风暴部分	☒	☐	☐	☐	☐
设计竞赛评估部分	☒	☐	☐	☐	☐
设计竞赛评估协调部分	☒	☐	☐	☐	☐
设计竞赛知识分享部分 很满意，资料延	☒	☐	☐	☐	☐
设计竞赛知识延伸部分	☒	☐	☐	☐	☐

您认为那部分（草图-头脑风暴-设计竞赛-知识综合与分享）您学到的的知识最多，您对组织方式有何提议？

Which part of the workshop (Draft- brain storming-design competition-synthesis and sharing) do you think that you have learned most, what are you suggestion of the organization?

时间跨度应该更长，过程中有必要更多的学习相关具体知识。

您在本次设计工作小组中遇到最大的困难是什么？ 您是如何克服的？
What are the challenges of learning during the workshop, how do you overcome the challenges?

节能技术方面，没有克服。 书上面相关知识。并不是发自内心的了解，比如太阳能板并不了解。缺乏一些基础知识。

请提出您对可持续性设计在中国发展的看法?
What are your understandings of sustainable urban development in China?

	非常	有必	一	没有必要
可持续性设计实施战略	☐	☐	☐	☐
可持续性设计应用指标系统	☐	☐	☐	☐
可持续性设计解决方案-绿色建筑	☐	☐	☐	☐

非常有必要。 未来的一个大方向

您认为这次设计竞赛小组学习对您最大的影响是什么？
What are the major impacts of the workshop in terms of learning of design knowledge?

技术方向的困扰还是没有得到解决， 很有专业性，不能短时间内掌握，收集质料和同事之间的交流。

您对提升可持续性设计在中国发展的建议是
What are you suggestions to promote sustainable urban development in China?

要从人本身提升，人的观点和能耗习惯，人的思想。 绿色建筑的条规，公司有相关培训，国家制度上有改变。 工作之余，有时间看一些和工作相关的书，个人行为会注意。

实际的项目，参与设计竞赛。

Appendix 2. Workshop venue and Procedures

VENUE The workshop was held at Ha Long Kay Architectural Design Co., Ltd.- 长厦安基建筑设计有限公司 (National Design qualification A) in 6. Yubei Zhong District, Chongqing -重庆市渝中区李子坝正街66号附6号, China

Date: 21st, July 2014- communication seminar on the topic of sustainable planning and design strategy, indicators and applications. The Low2No project was used as the reference for learning by doing. The relevant information of the Low2No case was provided to the participants.

Date: 13rd August 2014-dialogue based competition as learning tank

Table 10. Operational timetable of 13rd August 2014 of the action research

Welcome, introduction, workshop orientation	
Session 1	Present the workshop goals: design competition as a learning tank Introduction presentation on design competition Present and discuss the essential question *Materials*: Power Point slides for general introduction
Session 2	Individual presentations on participated design proposals on the learning process of Low2No *Objective*: Participants become acquainted with sustainable design and planning knowledge related to physical project, share their expertise with others, and finish by correlating the new information with their current practice. **Observation on design activities** *Materials:* Relevant materials on sustainable planning and design strategies and indicators such as the green building standards in China.
	Lunch Break
	Brainstorming Activity: Present, discuss and reflect the essential questions *Materials*: the introduction of sustainable urban development, parameters and indicators. *Objective*: constitute common knowledge back ground
	Introduction presentation on sustainable urban development in Finland and China Present and discuss the essential questions *Materials*: The introduction slides of sustainable urban development in Finland. The site condition of Jätkäsaari, sustainability framework Carbon footprint, relations between building and city.
Session 3	Open discussion
	Individual presentations on perceptions on the differences on design and planning between Finland and China **Communications with advisors** *Objective:* Participants share successes and barriers that they encountered; Participants learned and established common background knowledge of sustainable design and planning knowledge basis in relation to the design tasks. Presenter highlights main perceived features of sustainable design and planning knowledge and responds to audience questions *Materials:*
	Submission of first-draft of design proposal on learning process. Confirm the final submission date

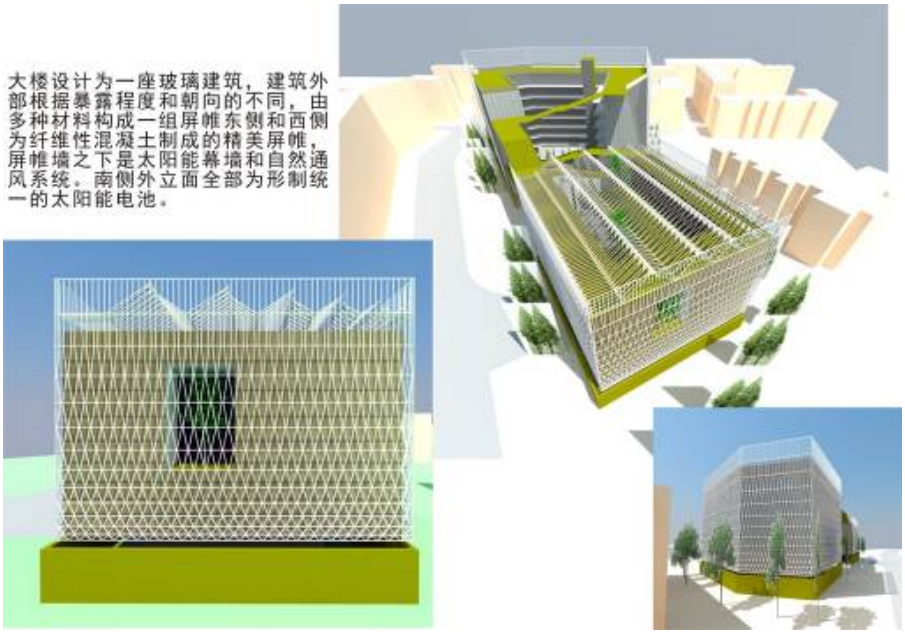
Dialogue based competition: 20th August 2014

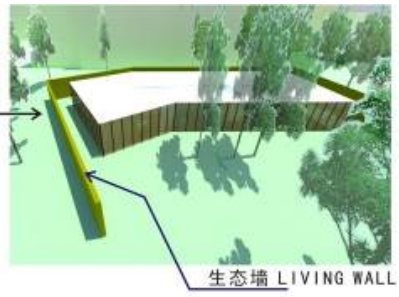
Table 11.Operational timetable of 20th August 2014 of the action research

Reflection, Discussion, and Sharing	
Session 4 Evaluation discussion	Final individual presentation on design proposals Group discussions and presentations *Objective:* Participants will discuss and share ideas about applying sustainable design and planning knowledge into practices. *Activity:* address the essential questions: how can I incorporate sustainable design and planning indicator system into my practice? (Group participants into teams of 2-3 members; allow 5 minute personal reflection, 3 minute role assignments: note taker, time keeper, and presenter, 10 minute group discussion, 10 minute sharing with larger group)
	Jury member: Building Director of Ha Long Kay – Solution Centre: Chen Qiu (Ha Long Kay Architectural Design Co., Ltd.) PhD candidate of YTK Land Use Planning and Urban Studies Group, Aalto University: Zheng Liang CIFI real estate manager: Yi Liang *Materials:* documentary of evaluation process
	Open discussions on winning proposal
Session 5 Competition synthesis : Pack the toolbox and sharing resource	*Objective:* introduce participants to the synthesized sustainable planning and design strategies, indictors and toolbox *Questions:* how do you understand the relationship between sustainability and pilot urban development project, is it integrative in China? Do you expected to set up a shared and regulated platform to share design knowledge? *Materials:* Power Point slides introducing the toolboxes Introduce participants the general evaluation criteria of design competition and related discussion *Demonstration:* Sustainable urban planning and design cases Europan 9 Greater Helsinki vision 2050 Low2No: http://www.Low2No.org/
	Distributed questionnaire to participants *Objective:* assess effectiveness of workshop. *Materials*: workshop Evaluation Form
	Open discussions

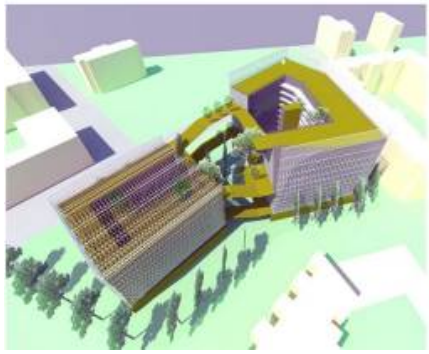
Appendix 3. All final submitted design proposals

Final Design Proposal from Participant No. 1

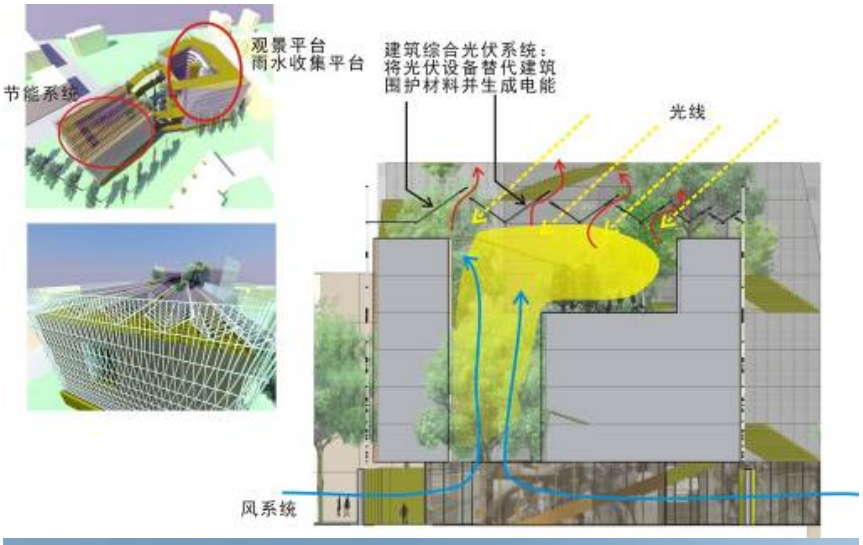


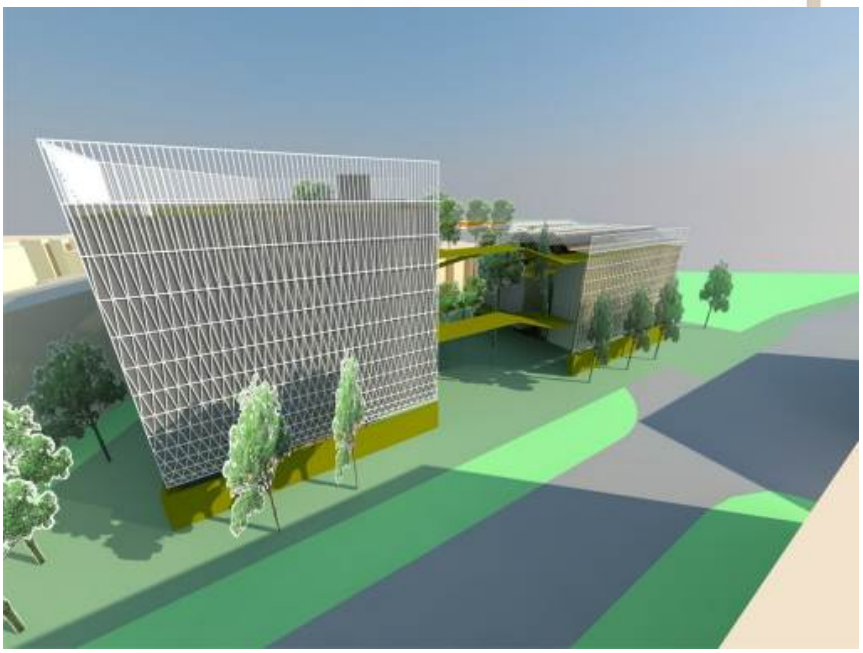


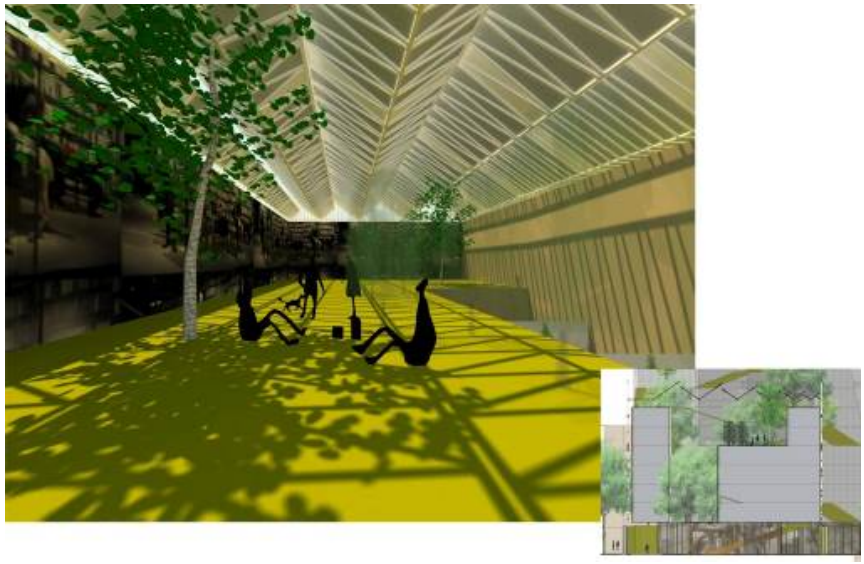
生态墙：生态墙是一个立体花园，墙面是自然空气过滤器，当空气经过景观墙体进入建筑的空间时，过滤掉挥发性有机化合物及二氧化碳。生态墙是一个生物过滤器，可以重建与自然环境十分类似的生态环境。隔热效果非常好，因此降低了能量消耗。即能在冬天保温，又能在夏天提供一套降温系统。



在连接两个体量的部分，由绿色纤维水泥建成的主梯盘旋而上，在大楼中央围合成螺旋形，将行人引导至屋顶露台可观赏到海湾美景。同时也具有实用性如发生火灾，可以提供便捷的逃生通道。且开敞的空间提供了良好的自然通风系统。盘旋的绿色主梯加上中庭景观构成的建筑的绿肺系统


观景平台
雨水收集平台
节能系统
建筑综合光伏系统：
将光伏设备替代建筑
围护材料并生成电能
光线
风系统

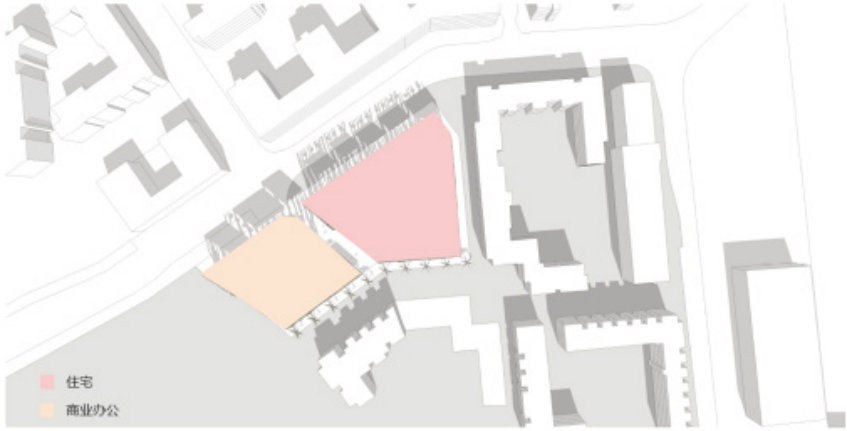




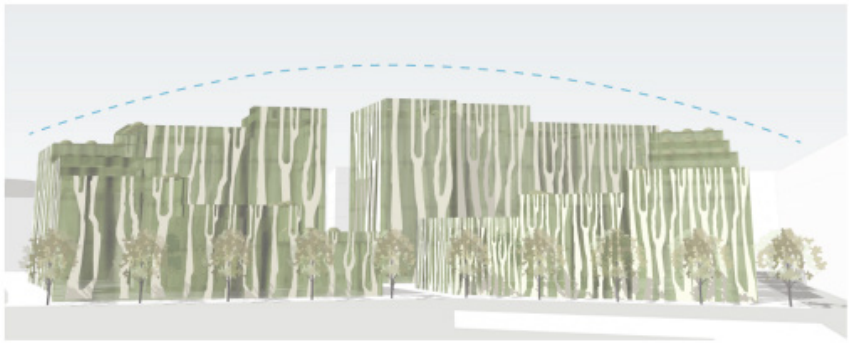
Final Design Proposal from Participant No. 2

总平面图

功能分区



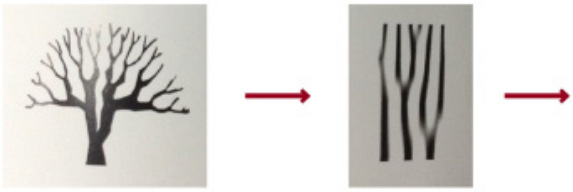
立面天际线



建筑整体平均高度 6 层，使对街建筑采光不被遮挡。
根据太阳角度位置，立面高度螺旋下降，保证内部建筑采光充足。

形体关系

立面构思



· 建筑整体形体简洁明快；

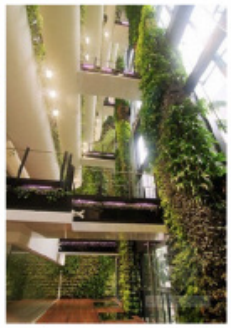
· 通体采用玻璃盒子造型，层层退台，形成螺旋下降的“s”形，体量变化丰富；

· 外表皮元素提取树形枝干轮廓，光照进来，树影斑斓，仿佛置身森林；

· 建筑整体感觉是树林中阳光下透明的玻璃体形态，如精灵的城堡一般美丽。

· 丰富的立体绿化及屋顶绿化，犹如身在丛林。

技术运用

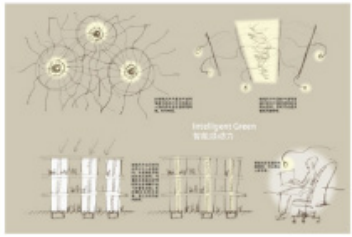


· 屋顶绿化

· 采光井立体绿化

·外立面立体绿化

雨水收集器



屋顶安装

太阳光纤照明系统

技术运用

中庭

太阳能伞

其他技运用：

·

智能空气调节系统，可根据室内人数自动调节室内温度；

· 地方材料和废物回收利用：利用当地和可重复使用的材料；通过真空系统和电动卡车将废弃物进行堆肥再利用；

· 采用预制件修建，减轻施工污染；

· 模块式空间布置，可移动墙体，增加空间的可塑性与灵活性。

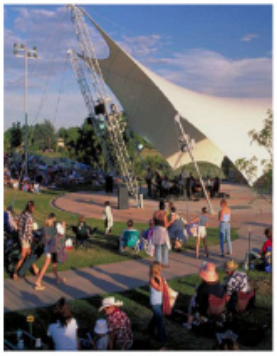
建筑采用三层中空玻璃，保温节能。

多处设置采光天井

增加光照与自然通风

可发电自行车

社区沿海发展设置风车，充分利用海上风能资源使社区满足使用。



其他

社区公园

交通以自行车，公交为主要交通工具，并设置自行车专用通道。

林荫大道

Final Design Proposal from Participant No. 3

Low 2 No 方案设计

王鹏飞

背景

商业使用面积：800m²

住宅使用面积：13200 m²

办公使用面积： 8000 m²（包括一个创新使用中心）

目标

- 节能减排；
- 有效稳定；
- 有引导性（标志性）；
- 可复制性

策略手段

1. 减碳：高性能围护结构、集中管线供暖制热，节水体系等节能手段；
2. 零碳：太阳能、风能等零碳能源的有效利用；
3. 负碳：绿化系统配合以上手段达到负碳排放。

方式方法

1. 通过采用节能型的建筑材料、产品和设备；

2. 合理设计建筑围护结构的热工性能，提高采暖、制冷、照明、通风、给排水和管道系统的运行效率；

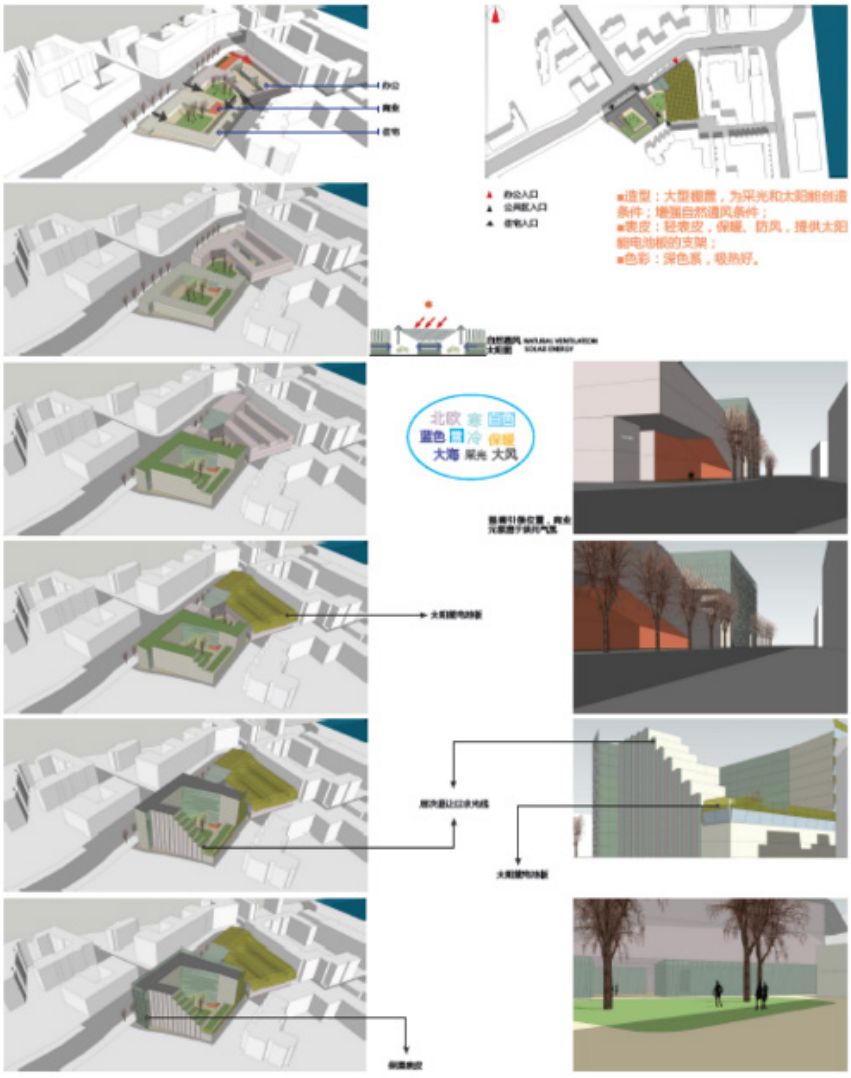
3. 利用可再生能源，在保证建筑物使用功能和室内热环境质量的前提下，降低建筑能源消耗，合理、有效地利用能源。

4. 建筑设计上用自然环境（如外界气流、雨水、湖泊和绿化、地形等）创造良好的建筑室内微气候，以尽量减少对建筑设备的依赖。

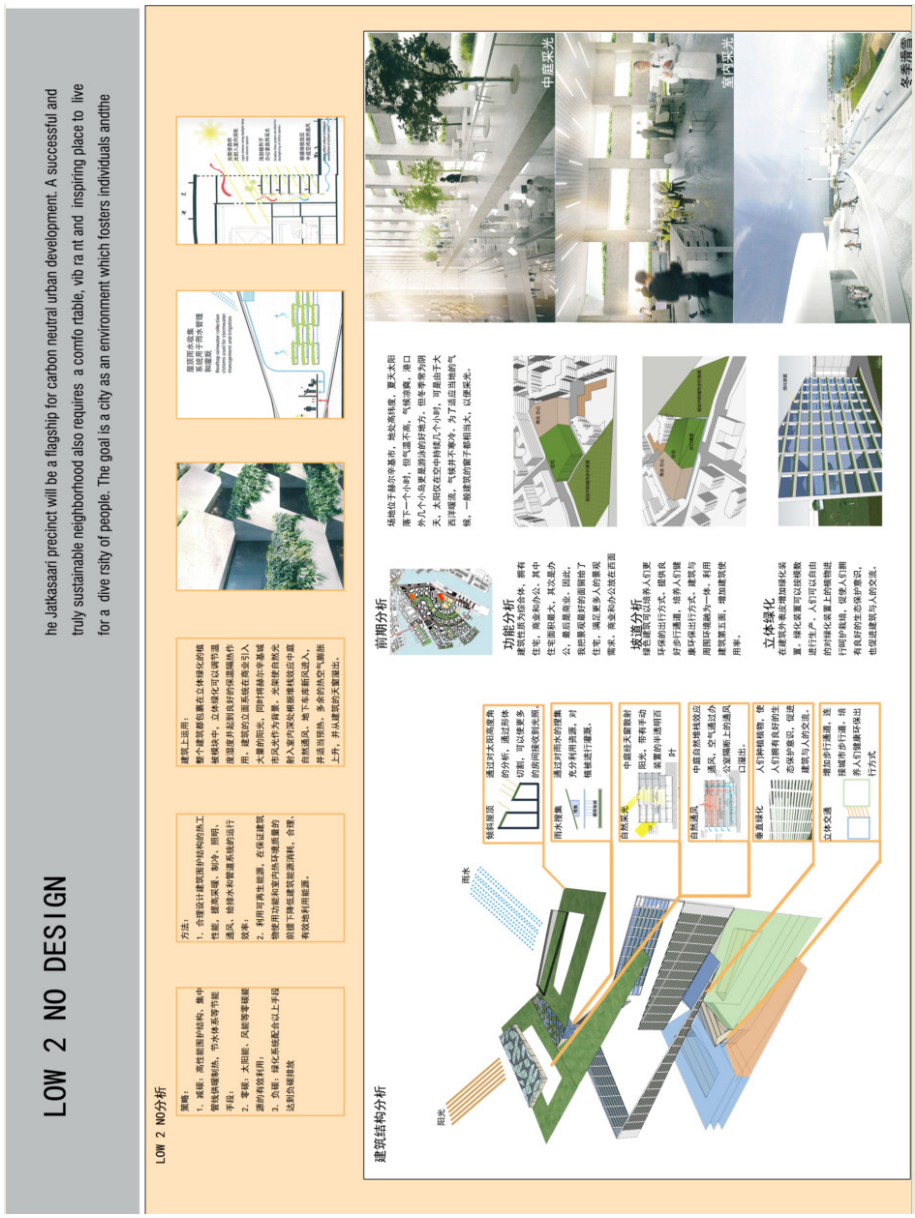
主要问题

意象空间

方案设计

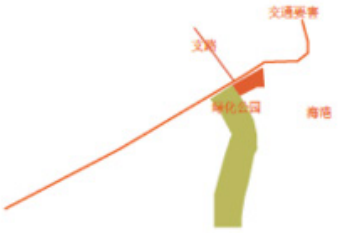

办公
商业
住宅
办公入口
公共区入口
住宅入口
■造型：大型椭圆，为采光和太阳能创造条件；增强自然通风条件；
■表皮：轻表皮，保暖、防风，提供太阳能电池板的支架；
■色彩：深色系，吸热好。
自然通风 NATURAL VENTILATION
太阳能 SOLAR ENERGY
北欧 寒 国国
蓝色 冷 保暖
大海 采光 大风
太阳能电池板
屋顶通山公园光线
太阳能电池板
保温表皮

Final Design Proposal from Participant No. 4



Final Design Proposal from Participant No. 5

芬兰赫尔辛基Low2No设计竞赛之互动城市

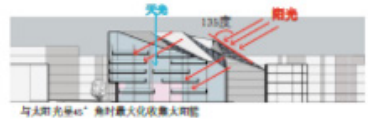


场地

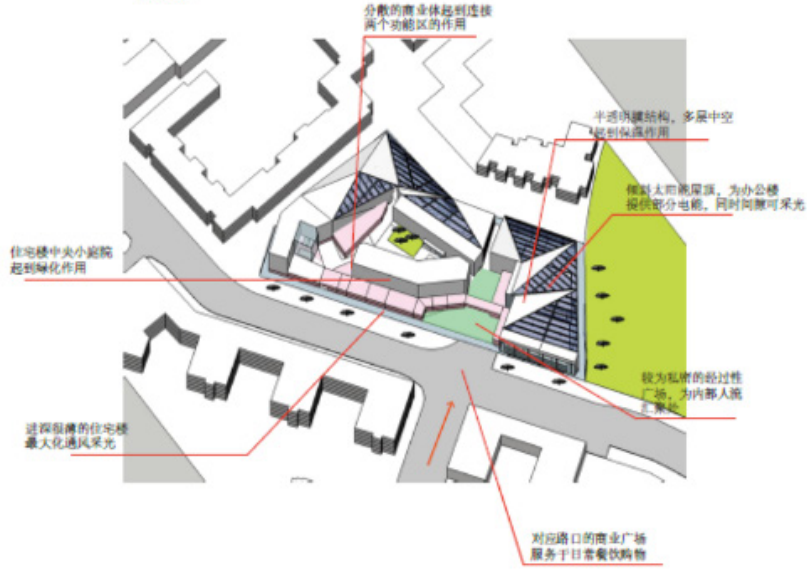
建筑单体具体要求：

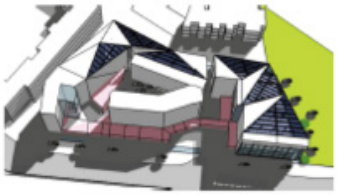
建筑占地面积： 22000 m2
商业使用面积： 800m2
住宅使用面积： 13200 m2
办公使用面积： 8000 m2 （包括一个创新使用中心）

建筑范例



倾斜屋顶概念示意图

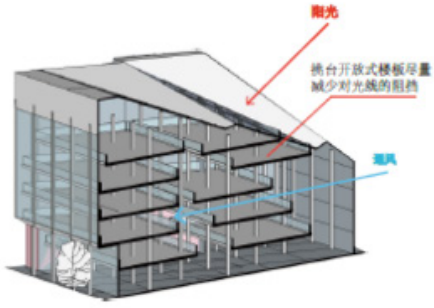




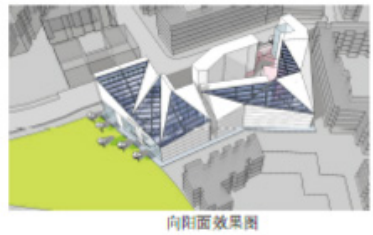
屋顶斜切面减小对阳光的阻挡,使后面的建筑也能大面积采光

阴影效果

功能分区

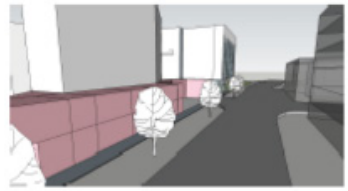


办公楼剖面



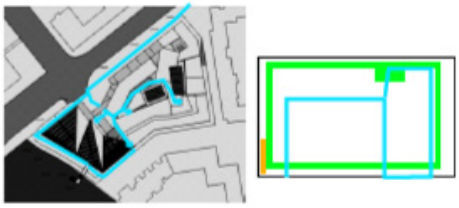
向阳面效果图

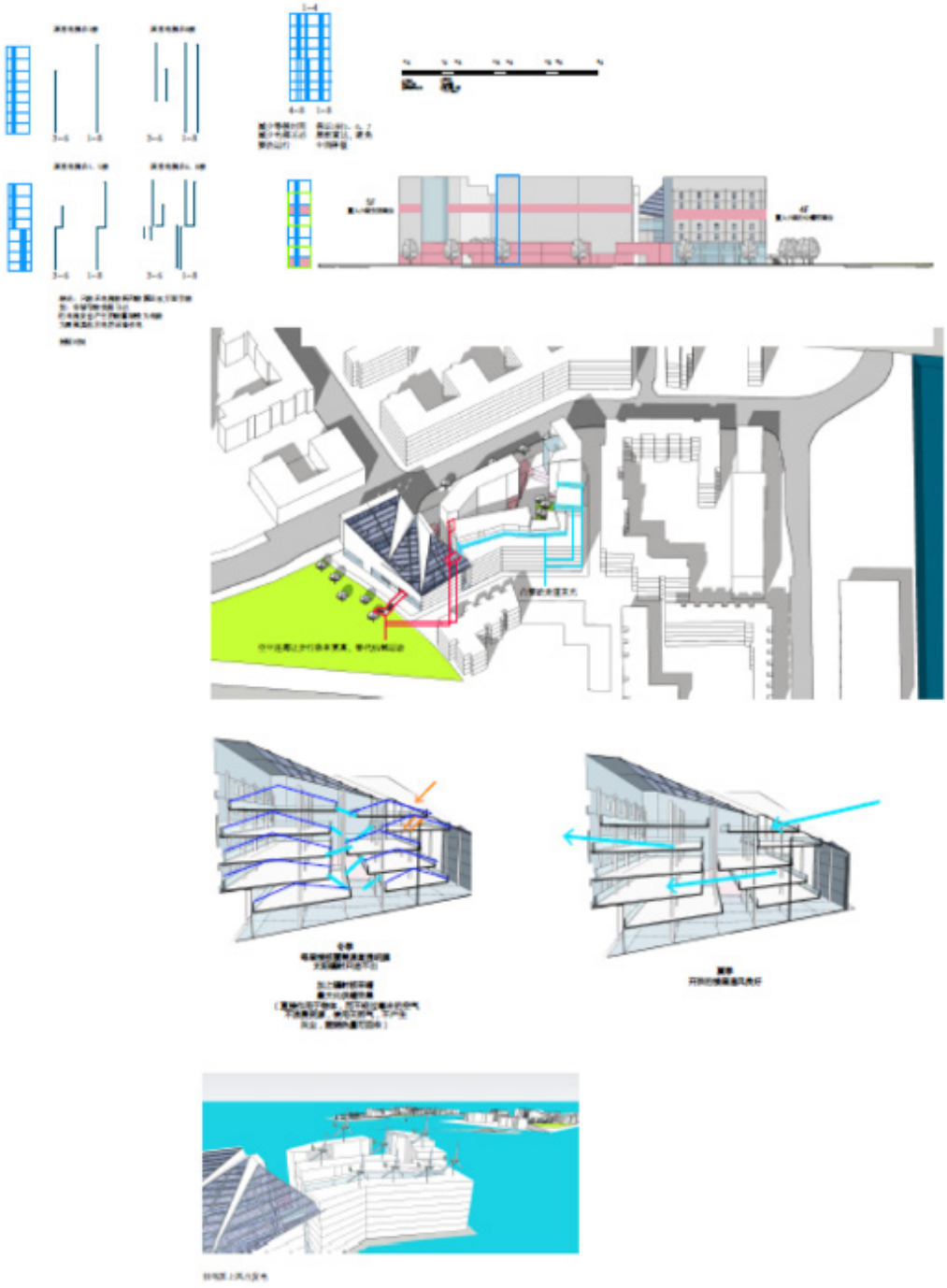
街道视角图



遇到的问题：
1.屋顶的异性造成屋面建造非模数化，容易增加成本，造成材料浪费，住宅的异形造成的后果也是一样
2.挑台式的办公空间相当于整栋楼是一个巨大完整空间它的温度很难控制


办公楼：6层
住宅 ：6–8层
商业 ：2层





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